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The Far Eastern Review

ENGINEERING + FINANCE + COMMERCE

THE PIONEER IN ITS FIELD

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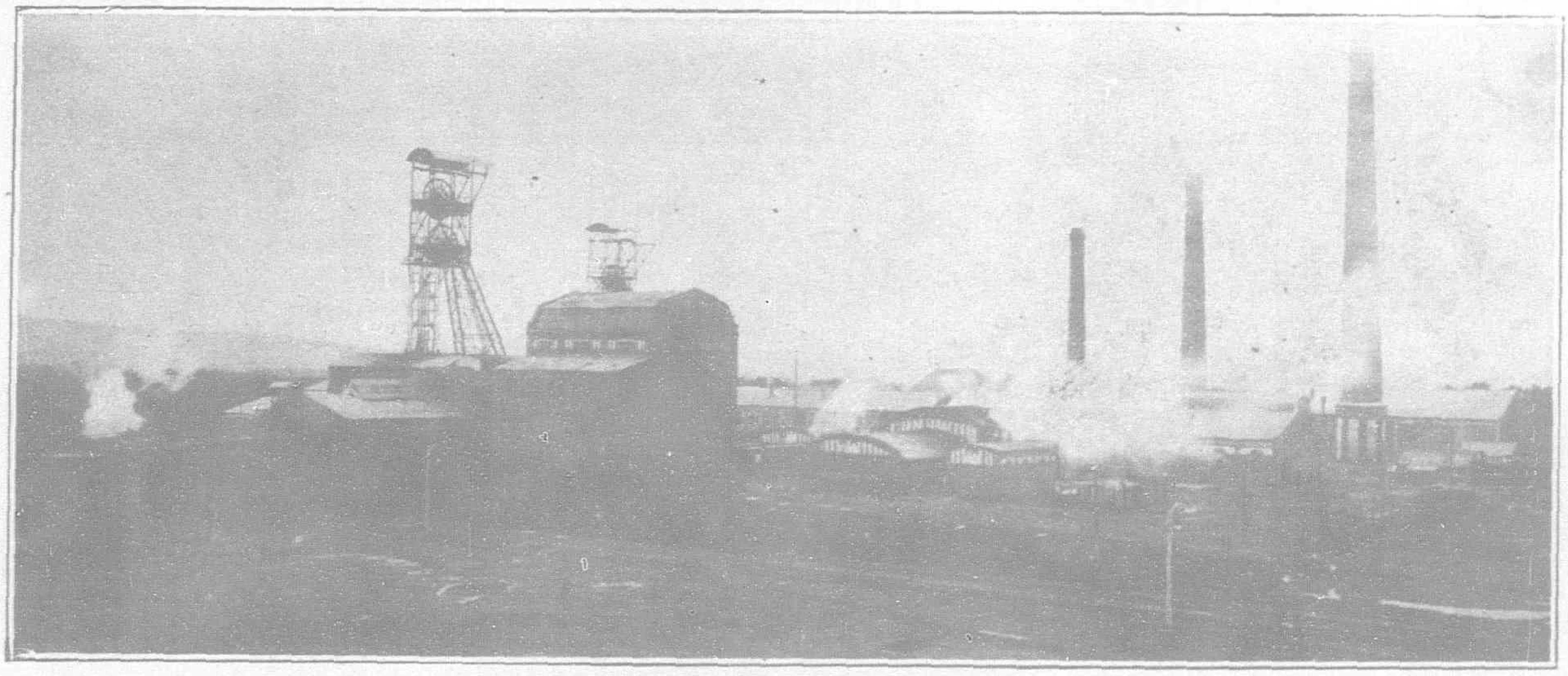

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SUMITOMO

KOBE HARBOR

ELECTRICAL DEVELOPMENTS IN JAPAN

SUGAR INDUSTRY IN CHINA

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SHANGHAI, PEKING, TOKYO AND MANILA

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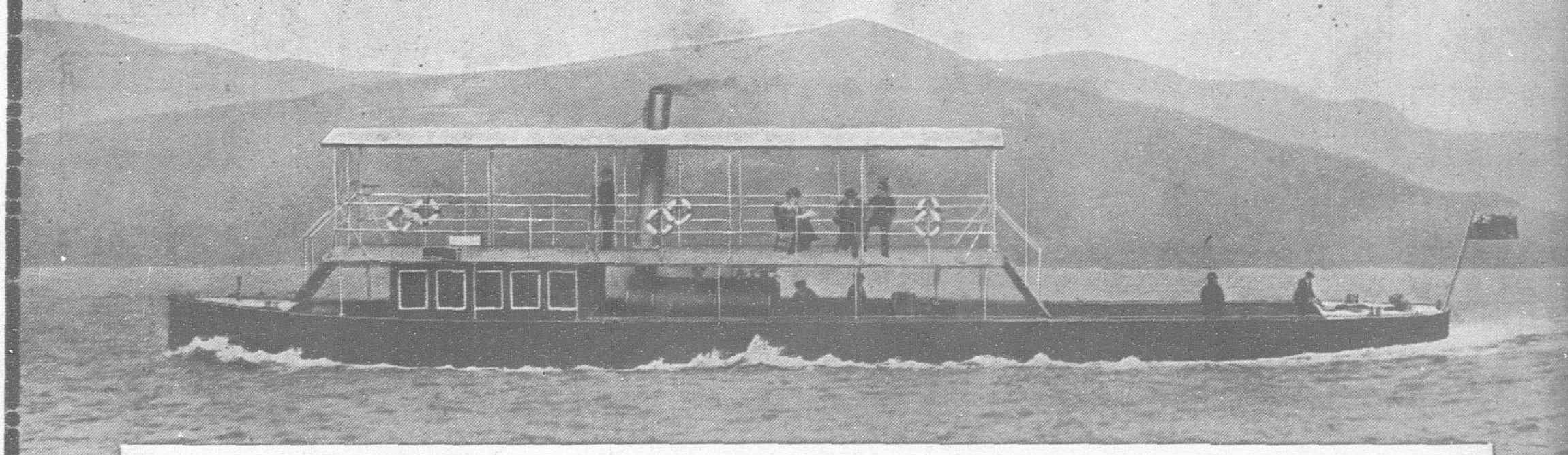

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The Far Eastern Review

ENGINEERING FINANCE COMMERCE

VOL. XVIII SHANGHAI, AUGUST, 1922 No. 8

SUMITOMO

A Prince of Industry

IT is difficult for the modern captain of industry to hide his light under the proverbial bushel. The press will eventually find him, pry out the story of how he did it and hold him up as a model for the rising generation to emulate. The story of America's millionaires has been told and retold. The successful British businessman rarely makes a fuss about these things. They are all in the day's work. But for shrinking modesty about industrial success one has to come to Japan to find a group of conservative, retiring and reticent captains of industry whose enterprises are part of the story of Japan's advance and whose beginnings are lost in the dim pages of past history. Their phenomenal rise in the past two decades equals, if not surpasses, many of the more widely known western names whose success is chronicled as part of modern history. It is only through official reports, the occasional stories that appear in some Japanese publication and by visiting the country that one gathers an idea of the full extent of the operations of such concerns. The Japanese captain of industry is not talkative. He avoids interviews. In fact, when it comes to publicity about himself, he has nothing to say. The barrier of language keeps his fame within the boundaries of his own country.

Back in the closing years of the seventeenth century, when America was still the Thirteen Colonies and England was about to establish a national banking institution, a copper mine was discovered along the shores of the Inland Sea of Japan and was opened and worked by the lucky discoverer. So was born the house of Sumitomo, a name to conjure with in present-day Japan. From this beginning 232 years ago, there has grown one of the most important enterprises of the world, which to-day operates with a total capital of nearly Yen 250,000,000 and controls copper, gold, silver, coal and iron mines, smelters, refineries, tube, wire and nail factories, fertilizer and lumbering enterprises, warehouses, steel works and a bank with Yen 70,000,000 capital having branches in all the principal cities of Japan and the Far East, as well as in London, New York, Bombay, San Francisco, Honolulu and Seattle. Where goes the trade of Japan, goes the house of Sumitomo. In a recent speech at Tokyo, Secretary of the Navy Denby described the bushido of old Japan as the "Way of the Gentleman." The house of Sumitomo lives up to this definition of the chivalry of Nippon and wherever it goes throughout the world, it carries with it the bushido of business, a guarantee that the highest and best traditions of Japan still live in the present-day struggle for trade.

For nearly two centuries the firm of Sumitomo confined its activities largely to the development of its mining interests, carrying on the work with unwearied research and scrupulous adherance to a code of business ethics which won for its products the highest place in the copper markets of Japan and as time passed, in the outside world. With the growth of the mining business and the accumulation of profits, the house of Sumitomo branched out into banking, advancing large sums to the Daimyos under the Shogunate and the merchants of the city of Osaka, which was then gaining its prominent position as the centre of commerial and industrial Japan. The Osaka of to-day, that great smoking behive of Asiatic industry, was made possible, in part, through the civic pride of the Sumitomo firm which for over two centuries has maintained its head office there and identified itself with its growth and prosperity.

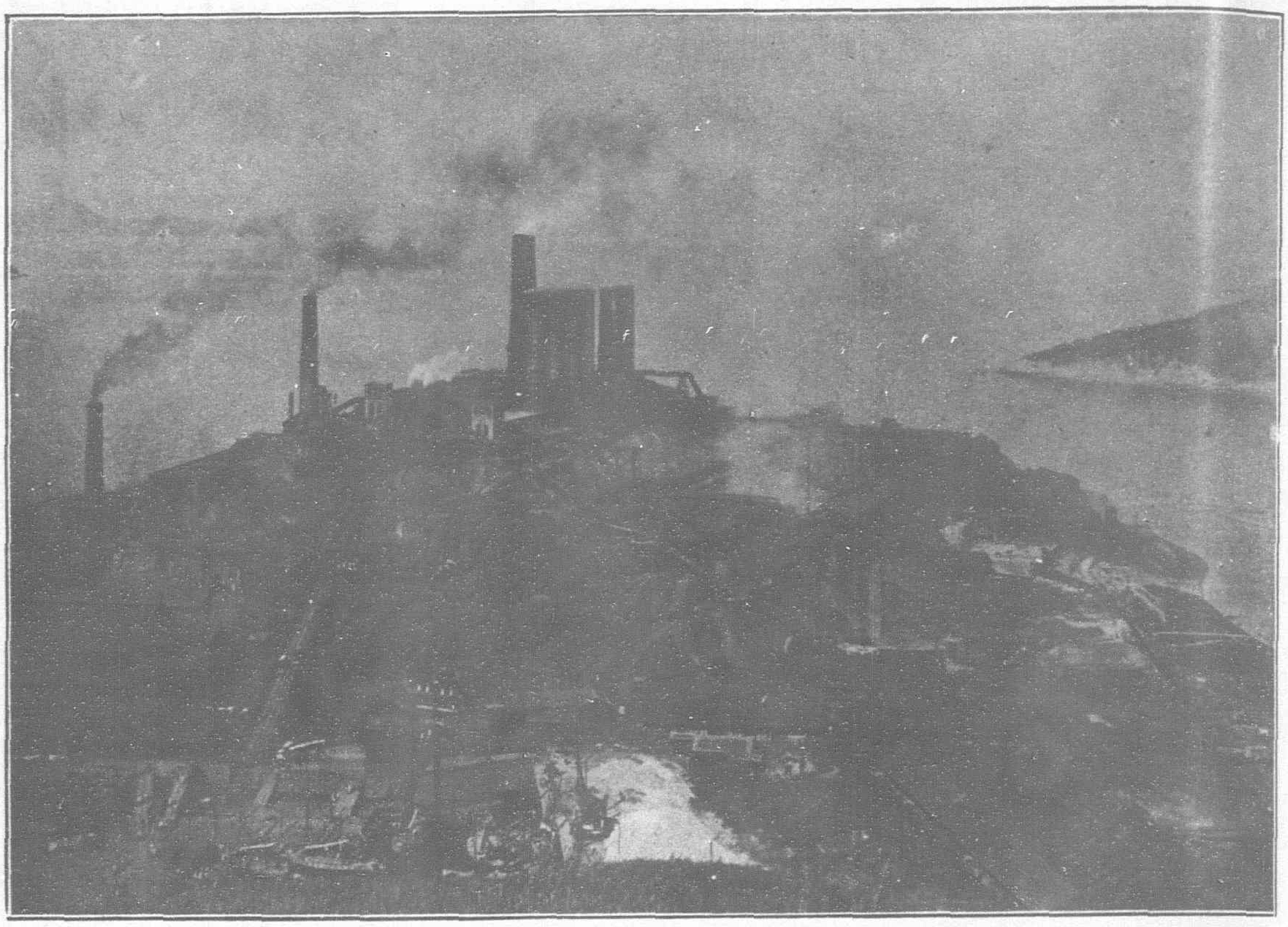
With an output of 1,497 tons in 1698, the Besshi Copper Mine on the Inland Sea of Japan took its place as one of the world's great producers, a place it has held until now it is treating 233,000 tons of ore and producing some 3,000 tons of refined and 11,230 tons of electrolytic copper, with every indication that it will continue to produce indefinitely without any alteration in quality. Shortly after the restoration, the Sumitomo firm opened a special office at Kobe for the export of its copper products, and with the progress of Japan and the expansion of the firm's activities, the selling organization has now its own offices in all the leading cities of Asia, and several in Europe and America.

In 1894, the firm bought out a copper rolling concern in Osaka and under the name of the Sumitomo Copper Works started to manufacture copper rods, plates, tubes and wires from the output of the Besshi mine. Three years later, a branch factory was established at Nakanoshima for the manufacture of zinc plates, rods and aluminium plates and wires. In November, 1895, the manufacture of insulated wires and electric cables was commenced, and in November of the following year solid and drawn tubes were successfully turned out. Later a plant was erected to make large copper sheets, and a branch factory erected at Amagasaki for the manufacture of wire nails, and galvanized wire. Constant improvements and the installation of the most modern equipment has maintained these plants at a high state of efficiency. The quality of the products has steadily advanced, being specified and approved for use in all Japanese government work, especially for the navy.

In 1894, the firm acquired coal properties in Kyushu producing excellent coking coal from the Tadakuma mine and from the Kiuragi mine some of the best steaming coal in Japan. The output of the two mines, which during the war reached 500,000 tons is now about 300,000 tons. In 1901, the firm entered upon one of its most important enterprises by purchasing the plant of the Nippon Steel Works located in Osaka, launching out as the first private steel works in Japan. These works have a melting capacity of 40,000 tons of acid and basic steel, which is converted into wheels, axles, rollers, shafting, cylinders, gear wheels, ship and engine parts. Its products are approved not only by the Japanese government but by Lloyd's for their A1 specifications.

In 1911, the wire and cable factory of the firm was made independent of the copper works under the name of the Sumitomo Electric Wire and Cable Works, which is now capitalized at Y.12,000,000 and is producing all kinds of electric wires, insulated and armoured cables and other conductors. In addition, a fertilizer factory was established in 1913 near the Besshi Copper Mine, where the ores are treated for their sulphur content, producing sulphate, nitrate and super-phosphates and compound fertilizers which are sold direct to the farmers through the firm's own representatives in each prefecture.

In addition to the copper and coal mines, the firm has developed gold and silver mines in the Hokkaido and it is expected that the proverbial luck of the Sumitomos will hold good and these will also enjoy as wide a reputation as the copper properties.

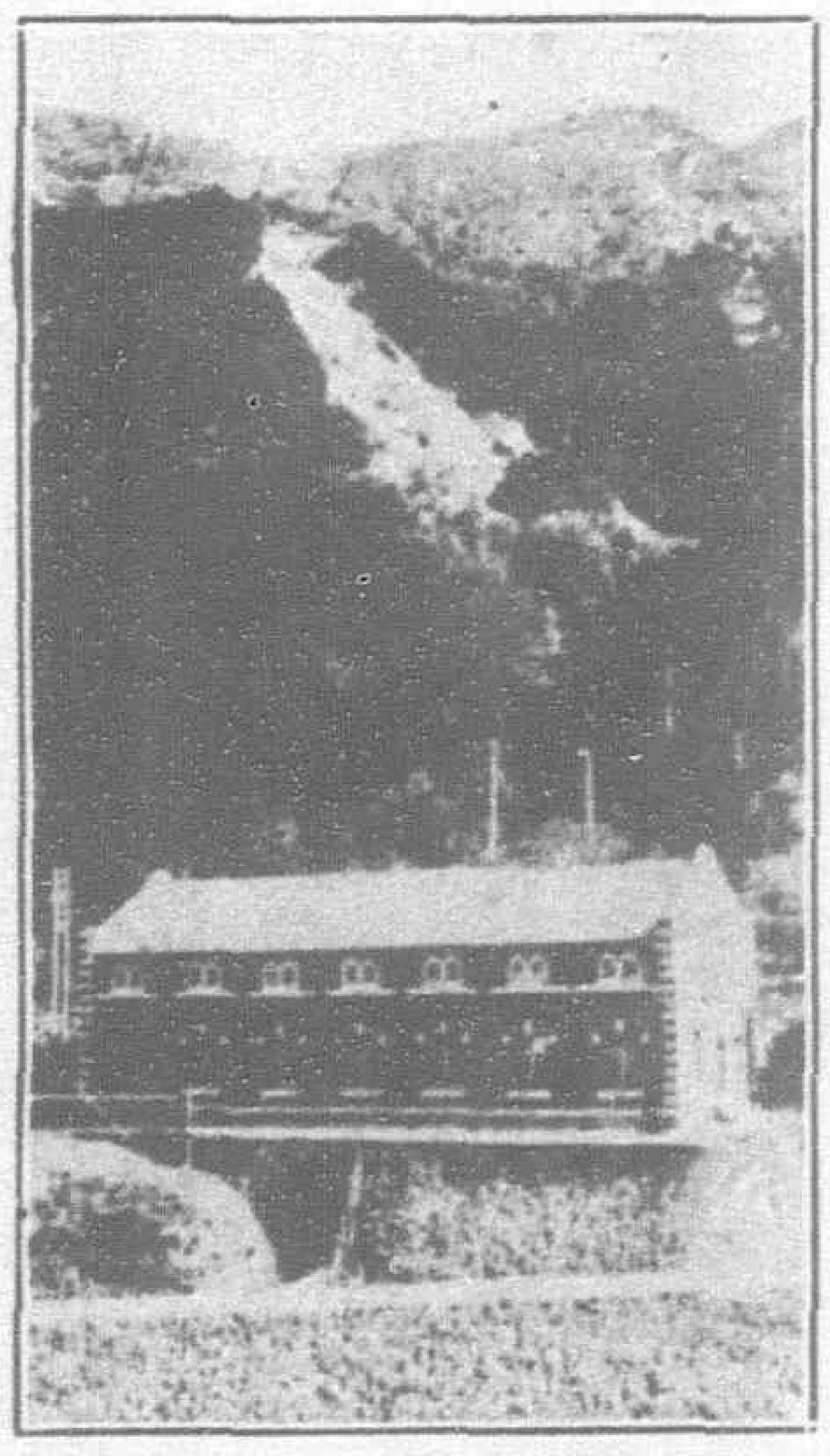


Sumitomo Besshi Copper Mine: Shisakajima Smelter

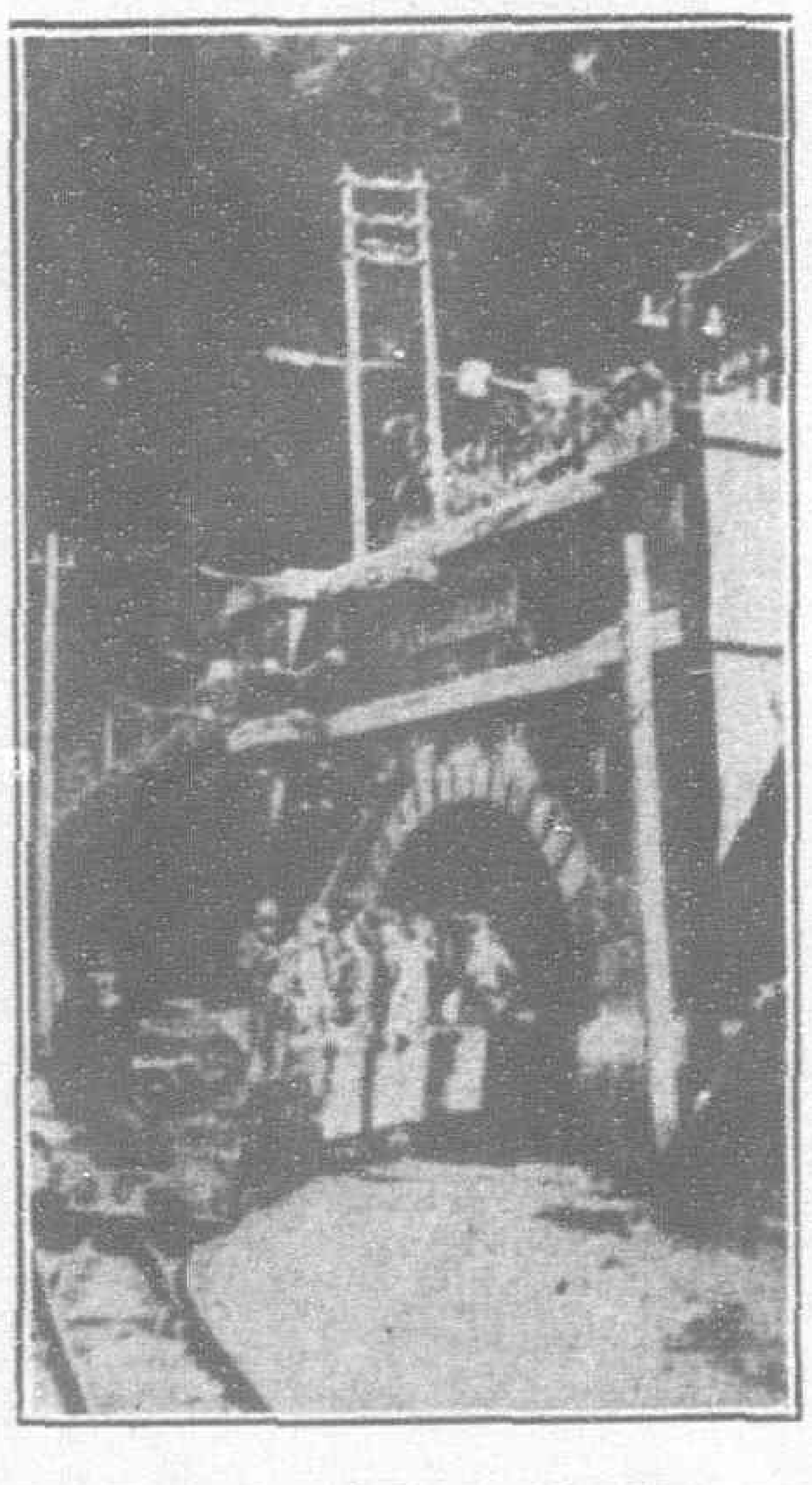
At the head of these prosperous enterprises stands the energetic descendent of a long line of noble ancestors, Baron Kichizayemon Sumitomo, the younger brother of Prince Tokudaiji (ex-lord chancellor to the late Emperor) and of Marquis Saionji, the last of the elder statesmen. He was adopted into the Sumitomo family in 1892 when twenty-eight years of age. In 1897 he set out on a tour of Europe and America. It was not the usual tour of the pleasure-seeking nobleman of other countries. His days were spent in visiting factories and mines, studying their organization, ways of conducting business and especially the methods for the promotion of the welfare and happiness of the workers. He was equipping himself for the huge task that some day he would be called upon to shoulder in directing the affairs of his house. Rarely indeed, is the picture presented of the descendent of a long line of princes surrendering the ease of aristocratic surroundings and court life to enter the turmoil of business in order that he might better serve his nation and advance the well-being of his dependents. Soon after his return from this tour, he was elected to the house of peers, but resigned in order to apply himself more closely to the development of the interests entrusted to his care. In 1911, he was created a baron in recognition of his services to the nation in advancing its industries. Since then he has devoted himself entirely to the management of the vast interests of the family he cast his fortunes with.

The solicitude shown for the welfare of the employees by the head of the house is reciprocated by an intense loyalty that cannot be duplicated in any similar enterprise in the world.

The control of the vast Sumitomo enterprises is centred in a *honten* or head office under the name of the Sumitomo Goshi Kaisha, a limited partnership at the head of which stands Baron Sumitomo. For the management of the firm's enterprises there is a board of seven directors and three managers who direct the affairs of the various enterprises and account to their head for all affairs of importance and see that his policy and instructions are rigidly adhered to. This central board is composed of the actual heads of the subsidiary companies. Its present composition will indicate the close working of the organization. The president is the head of the house, Baron Sumitomo. The directors are Masaya Suzuki (head director) who acts as general manager for the Sumitomo family. Here we have a high type of Japan's executives, an experienced lawyer who resigned from the government service to accept the management of the Besshi Copper Mine, and is now chairman of the board of the Sumitomo Electric Wire and Cable Works and of the Sumitomo Steel Works and a director of the Sumitomo Bank. Mr. Kwankichi Yukawa, president of the Sumitomo Bank, is undoubtedly one of the strongest characters on the central board, recognized as one of the most brilliant financiers of the empire. Mr. Chojiro Kusaka is manager of the extensive warehouse system of the firm; Mr. K. Ohdaira is the general manager of the Besshi Copper Mine and Mr. Junkichi Matsumoto is general manager of the Sumitomo Copper Works. In addition, there is Mr. Tadateru Sumitomo, a member of the family and Mr. Masatsune Ogura. The actual management of the head office is entrusted to three managers, Mr. M. Ogura, Mr. K. Honjo (who also directs the forestry and lumbering interests of the firm) and Mr. Naoji Hidaka.



3,000 kw. Hydro-Electric Plant Supplying Power to the Besshi Copper Mine



Fourth Adit, Besshi Copper Mine

Each department of the various enterprises has its own executive who reports to his special director on the central board.

The old policy of the firm was one of self-centralization and conservatism which limited its scope of operations to Japan and its foreign business to copper ingots. Under the new policy inaugurated about a decade ago, and under the guidance of the new central board, it began to expand and keep in touch with world movements. To-day, the Sumitomo activities cover the world.

Under the control of the central board of directors of the Sumitomo Goshi Kaisha are the following companies :—

The Sumitomo Besshi Copper Mining Office ; The Sumitomo Wakamatsu Coal Department ; The Sumitomo Fertilizer Factory ; The Sumitomo Copper Works ; The Sumitomo Warehouses ; The Sumitomo Forestry Department. In addition, there are the following subsidiary companies :— The Sumitomo Electric Wire and Cable Works, Ltd., capitalized at Yen 10,000,000 ; The Sumitomo Bank, Ltd., capitalized at Y.70,000,000 and the Sumitomo Steel Works, Ltd., capitalized at Y.12,000,000. The capital of the Sumitomo Goshi Kaisha is placed at Y.150,000,000 and with the subsidiaries this makes a total of Y.242,000,000.

We give herewith a brief description of the various enterprises mentioned above.

Sumitomo Besshi Copper Mining Office

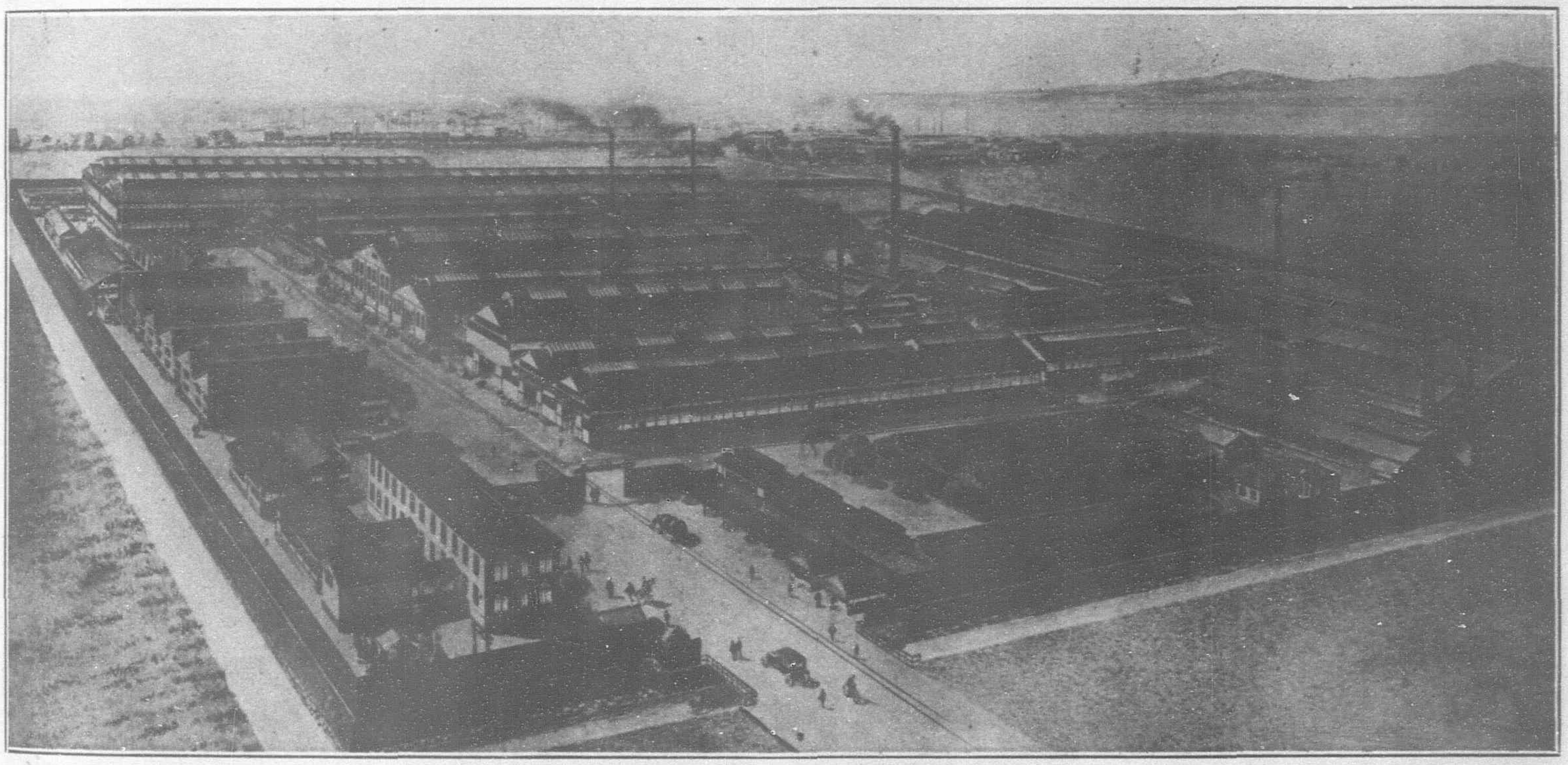
NIIHAMA, IYO

Mr. Komadzuchi Ohdaira, *General Manager.*
Mr. Unosuke Okada, *Manager.*

The Mt. Besshi concession covers over an area of some 7,000 acres, at 3,000 to 4,000 feet above sea-level, 12½ miles distant from the northern shore of Shikoku island. From its discovery, two hundred and thirty years ago, the output has been as follows :

Period	Years	Refined Copper, produced. Eng. ton.
1691—1867	177	43,508
1868—1877	10	12,933
1878—1887	10	25,454
1888—1897	10	48,094
1898—1907	10	49,216
1908—1917	10	78,600
Total 1691—1917	227	257,805

The annual output of ore is now about 233,000 tons, producing 3,000 tons of refined and 11,230 tons of electrolytic copper. When its output was about 1,499 tons in 1698, this mine must have been the foremost on earth. In the middle of the 19th century, the output began to fall, but with the installation of improved and better European methods for mining, transportation and metallurgical treatment, a steady increase has been maintained.



The Sumitomo Electric Wire and Cable Works

The Sumitomo's refined copper, or "K.S. Ingot of Japan," has very few metallic impurities. The Besshi refined copper contains 99.7 per cent. and the electrolytic 99.9 per cent. copper. It is of an exceedingly beautiful rose color and specially suitable for the manufacture of brass. It is sold at figures above the "B.S." brand on London market.

GEOLOGY.—The geological formation of the Besshi Mine is crystalline schist consisting of quartz-sericites and chlorite, between which lies the ore deposit, 5,000 feet long and 2 to 25 feet thick outcropping at the height of 4,000 feet above sea-level. The present working point is 3,000 feet, at the deepest, below the outcrop. The ores are cupriferous iron pyrites, with an average 3 per cent. of copper.

MINING.—An inclined shaft is sunk 1,782 feet along the dip of the ore deposit starting at the outcrop and having cross-cuts at every 260 feet with 8 levels. The shaft was sunk under the superintendence of M. Raloque, a French engineer, then in the service of the firm. There are two adits called "first" and "third" adits and a fourth 12 feet wide and 15,000 feet long and a blind vertical shaft, connecting the third and the fourth adit, 17 feet in diameter and 1,950 feet in depth.

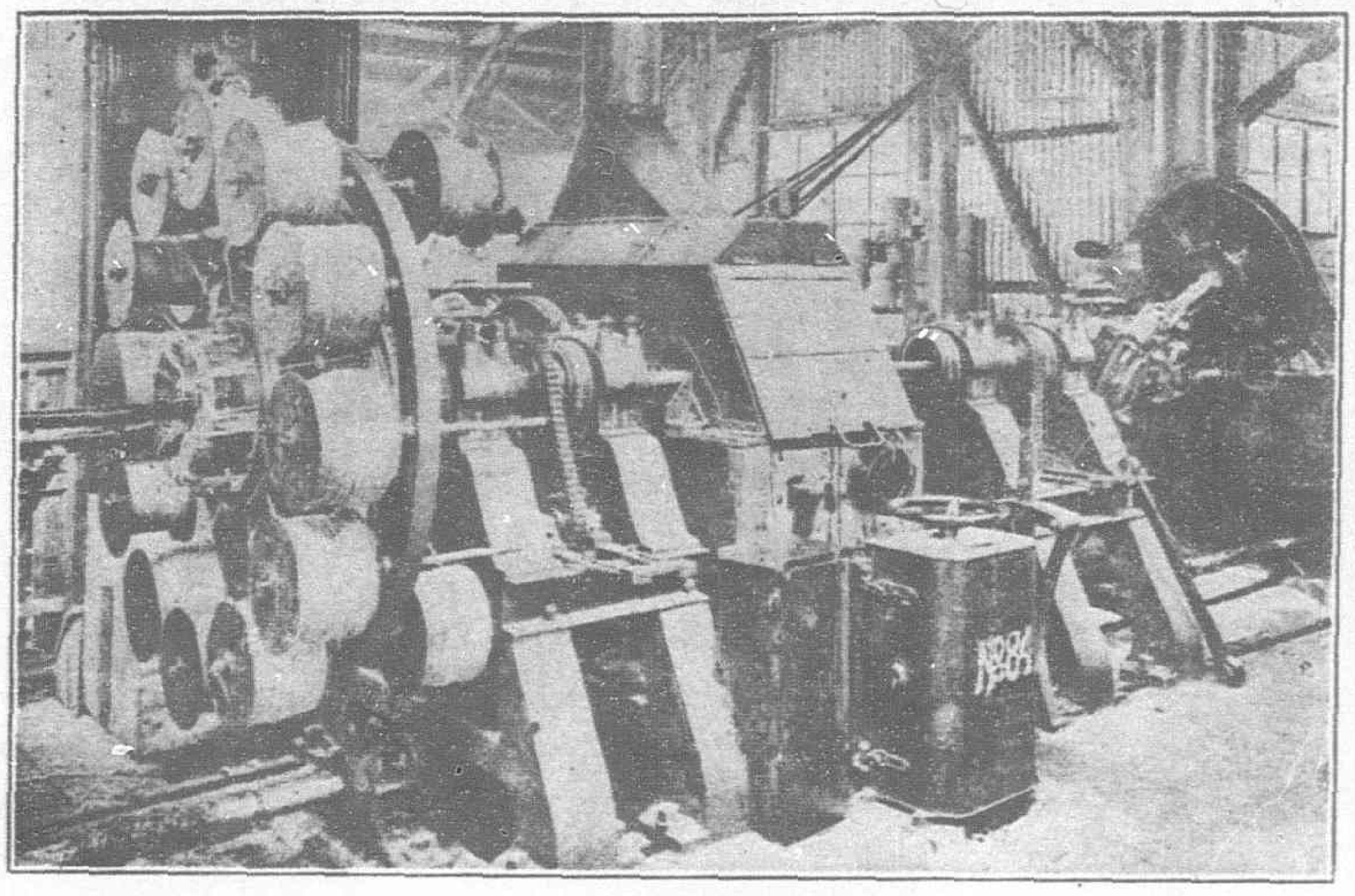
Ores are excavated by overhand stopping, hand-borers and hand-drills from the Pneumatic Company of Chicago and rock-drills of the Schramm and Walter Leyner type, and one improved by Dr. H. Kudo, mechanical engineer of the firm, are used.

DRESSING.—The crude ores are carried out of the mine to Tonaru on electric trolleys, where they are screened, crushed and picked according to the copper content. The dressing plant is on the sea-ward side of Mt. Besshi, and has a capacity of 1,000 tons a day.

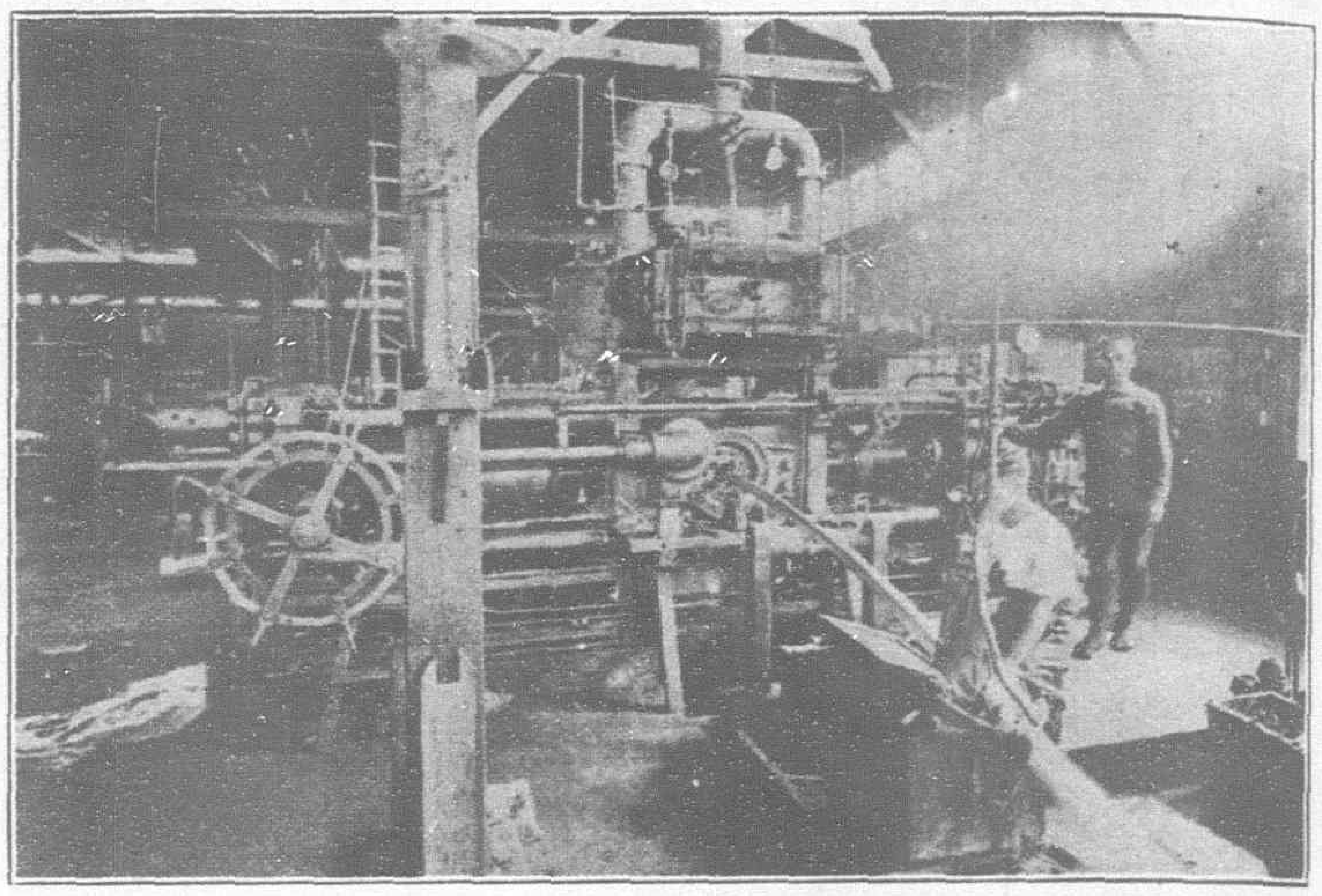
CEMENTATION.—Lest the mine-water charged with sulphuric acid, sulphate of copper and iron and other ingredients should damage the farms in the neighborhood, it is treated in cementation plants and then run direct to the sea by a drain, 10 miles long and 1½ feet square which is specially constructed for the purpose. A large tower-system cementation plant is now building.

METALLURGY.—The sorted ores are sent down to Niihama, where the main office for the mine stands, by aerial tramway and light railway. Between Niihama and Shisakajima island (9½ miles) a fleet of ore-boats ply daily carrying an aggregate of 400,000 long tons of ore in a year. On the island there is a modern smelter and a process of pyrite-smelting is in use. For fine ore and flue dust the most perfect pot-roasting plant is arranged. As the smelter is on an island more than nine miles distant on all sides from the farms, the fumes do not interfere with vegetation. A cable connects the island with Niihama. The matte from the blast-furnace is converted into crude copper by a Bessemer converter and "Atebuki," an improved method of the old "Mabuki" process. The refined copper is moulded into ingots known as the "K.S. Ingot of Japan."

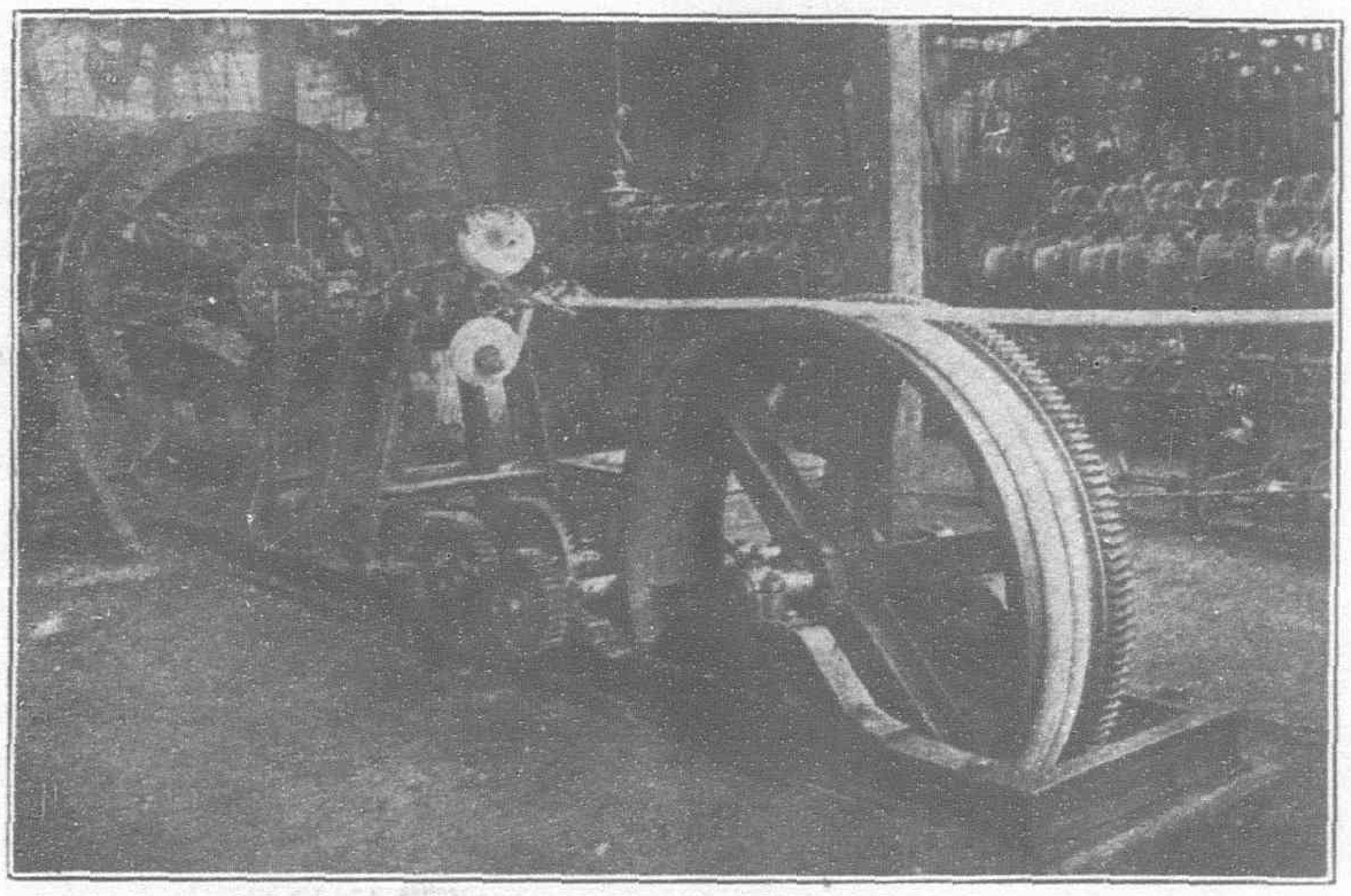
SUMITOMO ELECTRIC WIRE AND CABLE WORKS



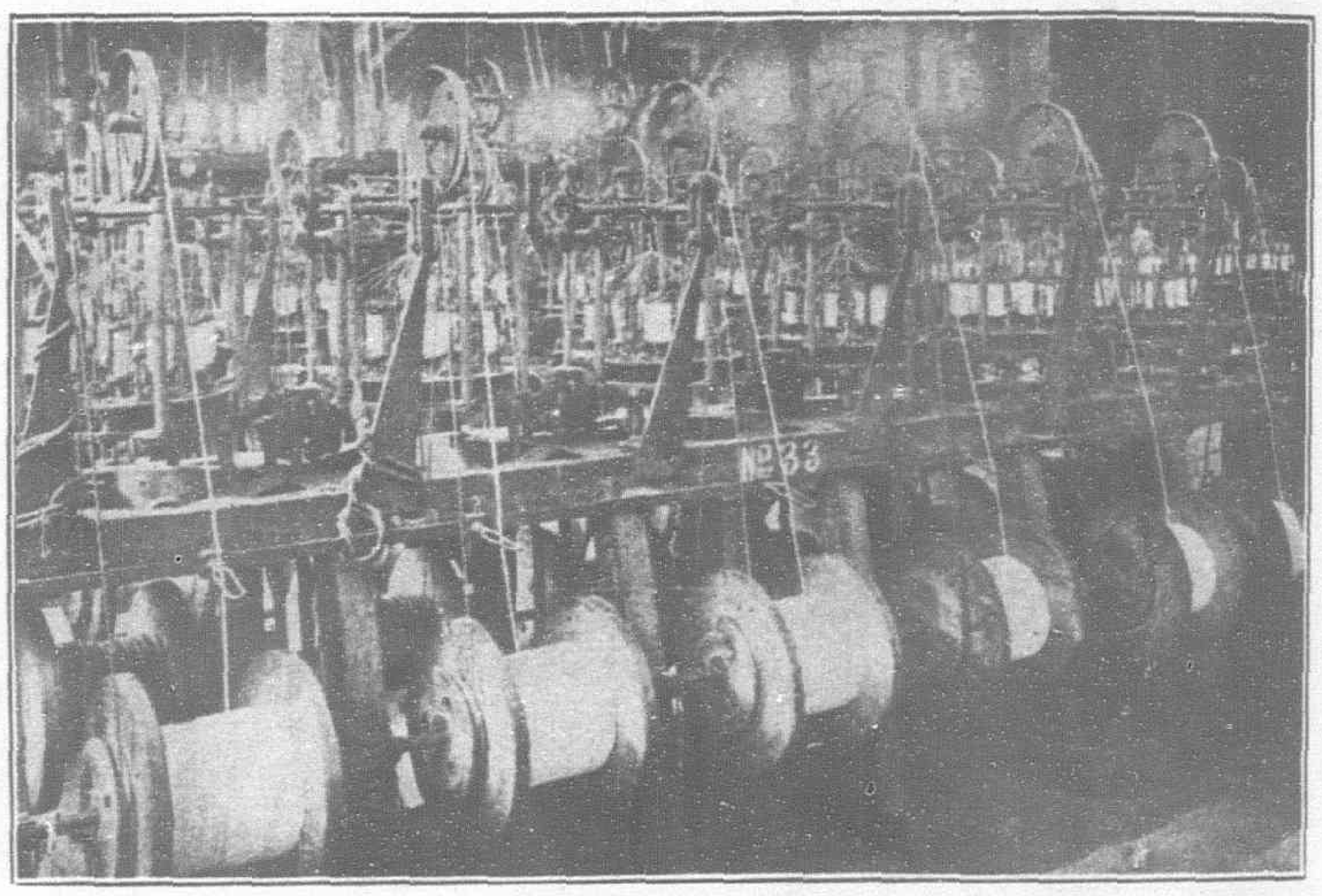
Armouring Machine



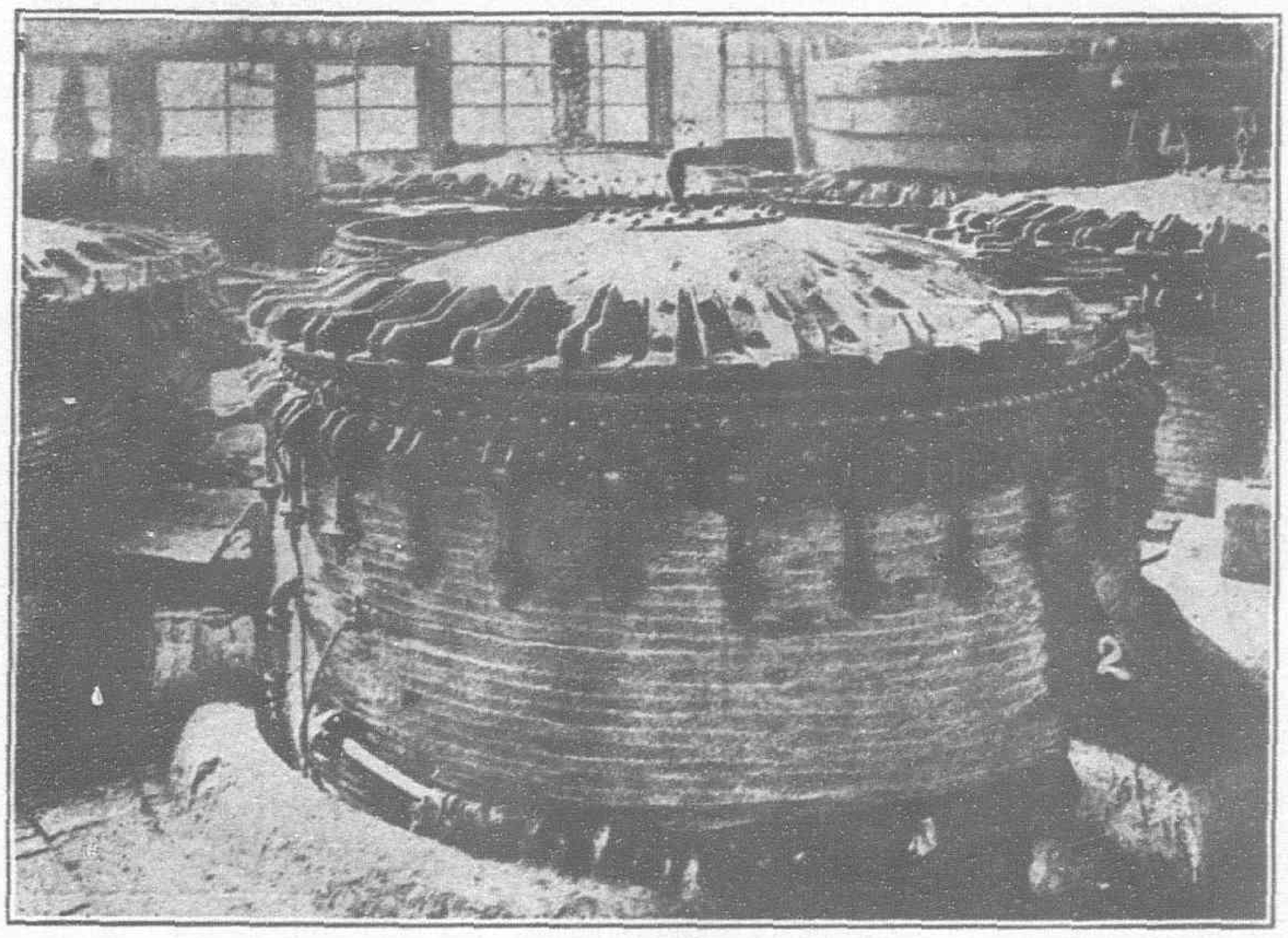
Lead Sheathing Machine



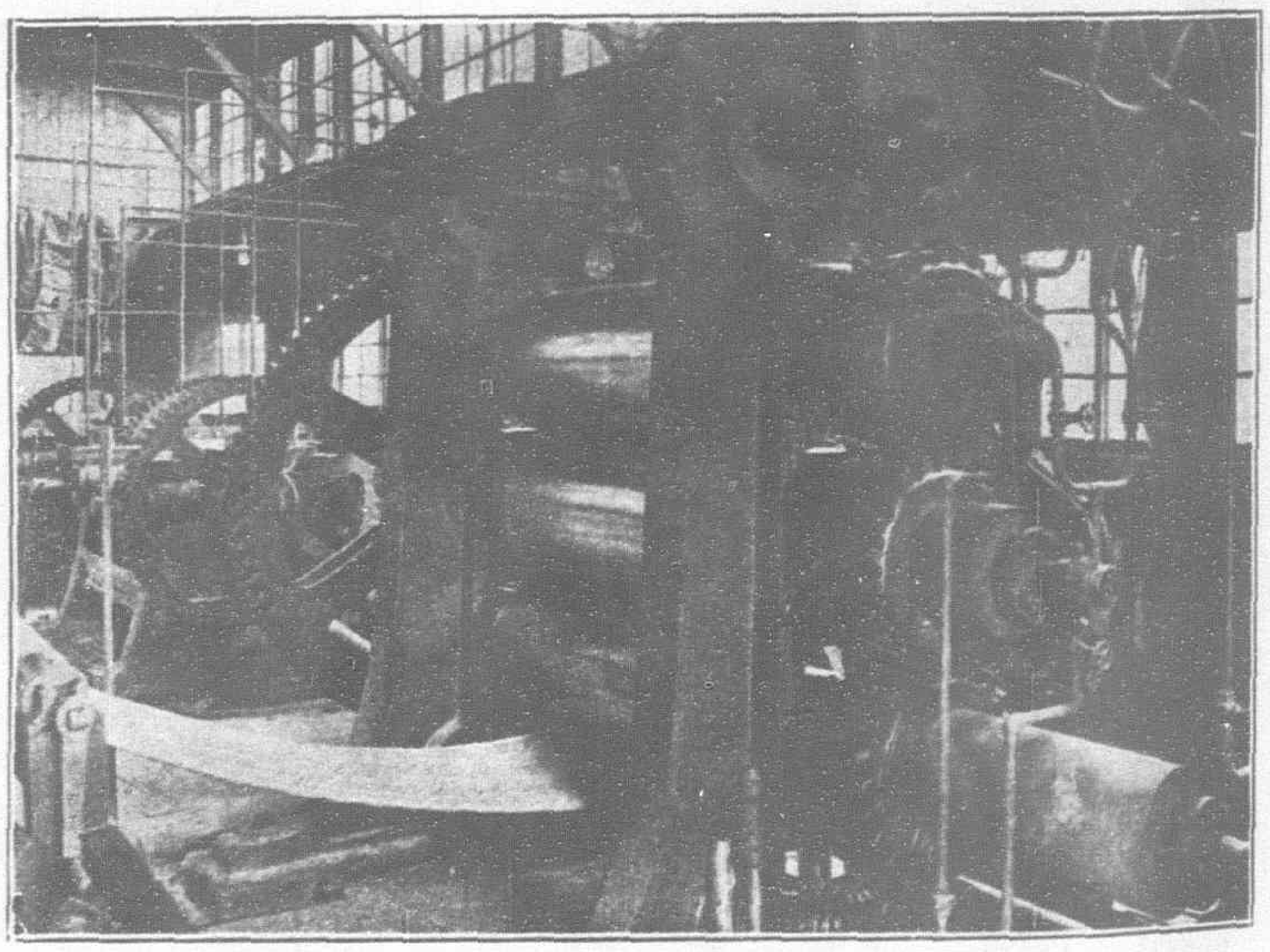
Telephone Laying Machines



Braiding Machines



Vacuum Tanks

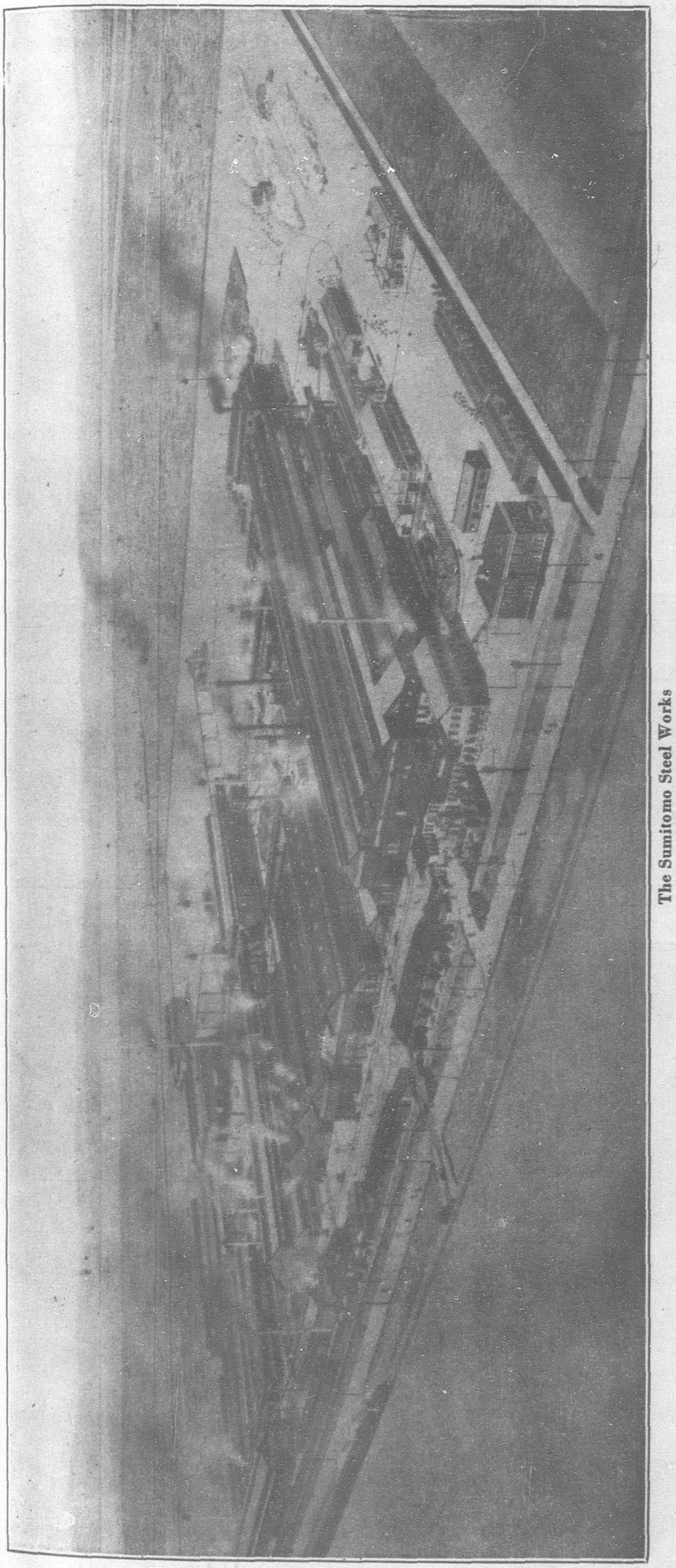


Calender Rolls

Motive Power and Transportation.—The motive power for the mining operations is derived from a 3,000 kw. hydro-electric plant. The water is led from Hiura on the eastern side of Mt. Besshi through an adit into the mine and along the third adit to Tonaru and then to Ishigasanjo, on the opposite side of the mountain. The fall is 1,969 feet with a volume of about 25 cubic feet per second. The power for metallurgical operations is generated by steam.

For ore and provision transport between Niihama and Tonaru, there is a light railway of six miles running from Niihama to Hateba and an aerial tramway of 12,276 feet which connects Tonaru and Kuroishi. For ore conveyance to Shisakajima, there is one tugboat and twenty-four sailing vessels plying daily. For copper ingots, passengers and general freight, the firm owns three steamers in daily service between Osaka and Niihama touching at Kobe, Onomichi and other places. For communicating among the many offices, a private telephone system with 247 'phones is provided.

Accessory Enterprises.—As regards accessory enterprises in which the Sumitomo Besshi mining office is engaged, mention



The Sumitomo Steel Works

may be made of the manufacture of coke used by the Shisakajima smelter and other works of the firm. Besides, they have mechanical shops for making and repairing mining tools. Meteorological stations are erected at all places of importance. Forestry goes hand in hand with the mining industry and the Sumitomo is pushing this work with vigor in the mining districts. It owns 30,000 acres and holds 50,000 acres on lease from the government for this purpose.

Welfare of Employees.—There are about 5,200 men on the pay-roll, 3,700 men in the mining department and 1,500 in the metallurgical. The promotion of their welfare has long been the care of the executives of the firm. At Niihama, a hospital has been established with branches at Tonaru, Shisakajima and two other places and medical aid provided free in case of accidents. Free primary schools are maintained for boys and girls of all the employees. Amusements and recreations are provided; theatrical and other entertainments are given from time to time. Houses are built and let to employees at a moderate rent. Daily necessaries are supplied at a very cheap price by the stores conducted under the firm's supervision.

Sumitomo Wakamatsu Coal Department

Wakamatsu, Chikuzen, Kiushu

Mr. Yoshiharu Yoshida, *General Manager.*

Through this department of the firm, coal from the Tadakuma Mine is disposed of. The concession includes the Kiuragi Mine of 1,000 acres and the Ohse Mine of 1,700 acres. The total area of the concession is 40,000 acres, of which 4,500 are being worked and the balance held for development. It yields black and bituminous coal of high heating value. The coal is very suitable for making coke. The output is as follows:

1911	322,000 tons
1912	376,000 ,,
1913	384,000 ,,
1914	374,000 ,,
1915	352,900 ,,
1916	331,000 ,,
1917	324,000 ,,
1918	263,000 ,,
1921 (about)..	300,000 ,,

The Tadakuma colliery is worked by two inclines, one 2,256 feet in length with an inclination of 20° and the other 5,304 feet long inclined at 14°. The coal is conveyed to the screening plants by an endless rope-system. Within the mine, everything in the way of modern appliances is employed for the sake of economy in labor and the welfare of the workmen. For the driving of turbine pumps and sinking shafts, an electric power plant of 400 kw. is installed. Transportation facilities are all that could be desired; the Chikuho branch line of the Imperial Japanese Railways passes near the colliery. Over 3,000 men are employed.

Sumitomo Warehouse

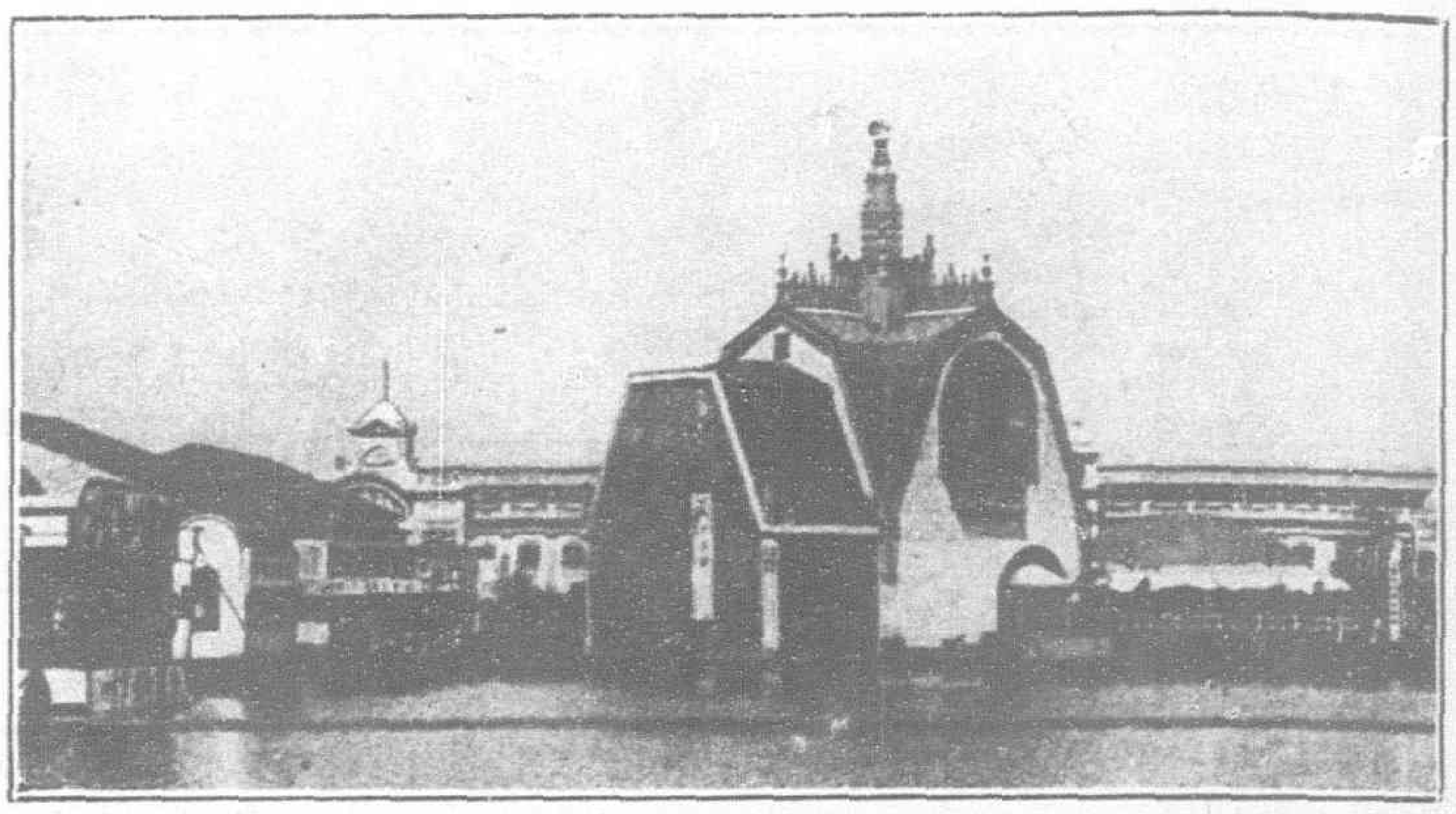
Nakanoshima, Osaka

Mr. Chojiro Kusaka, *Manager*

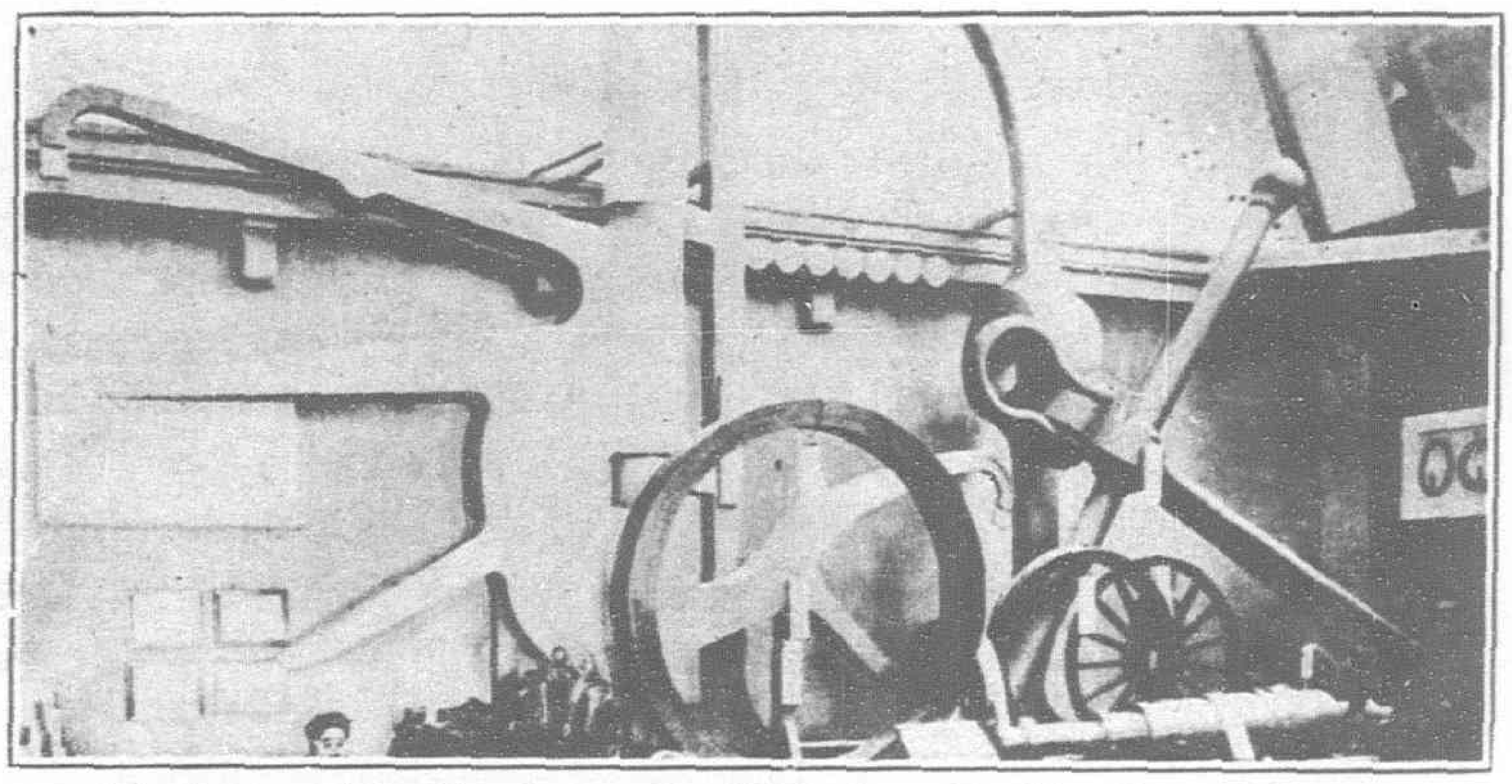
The Sumitomo warehouses were originally established for the purpose of storing goods taken by the Sumitomo Bank on mortgage. They were made independent of the Bank in 1899 and organized into a separate department to carry on a general warehousing business.

THE SUMITOMO EXHIBIT AT THE PEACE EXPOSITION, UYENO PARK, TOKYO

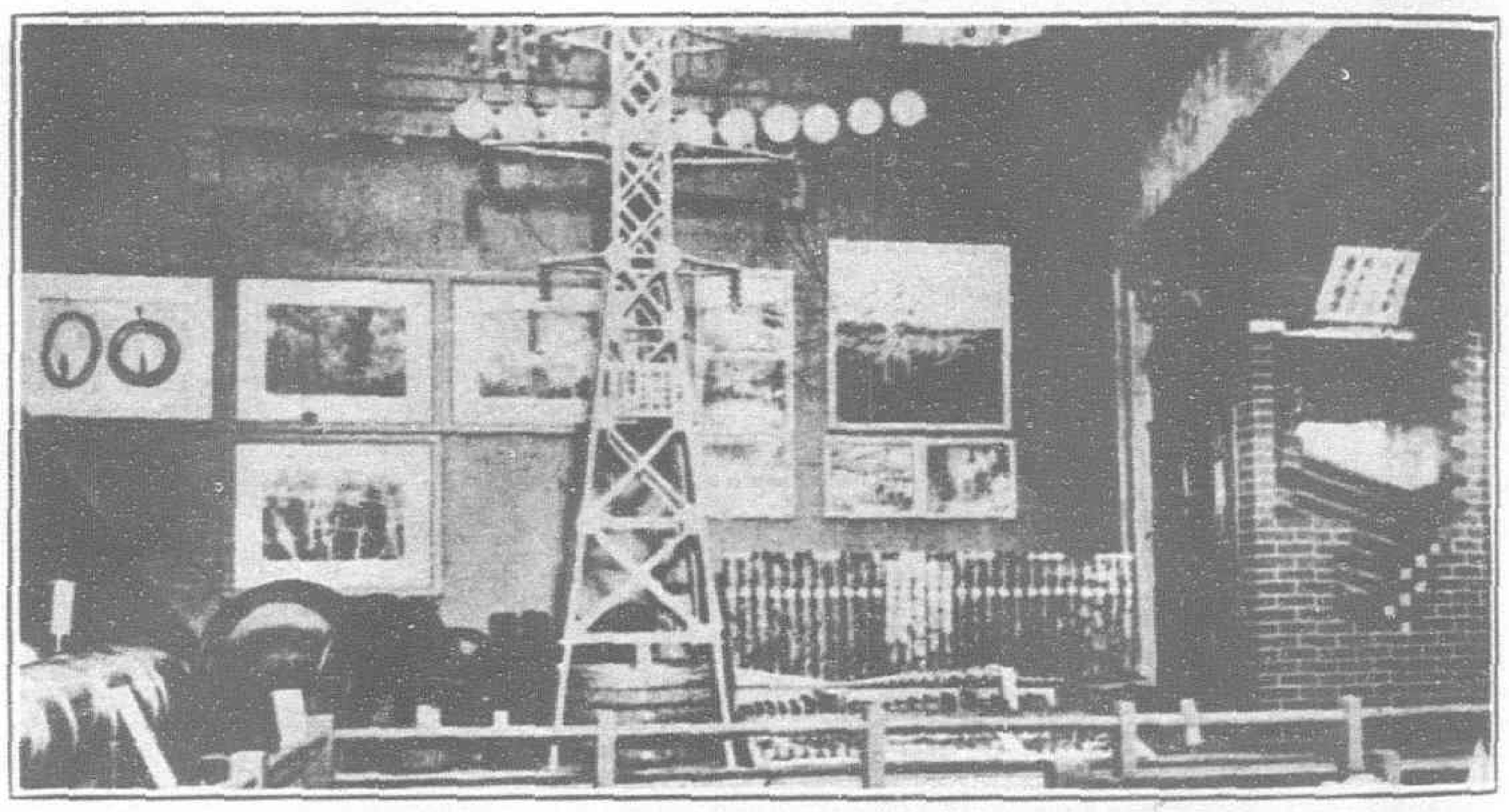
Visit of the Crown Prince to *Uyeno*. Entering the Sumitomo Palace



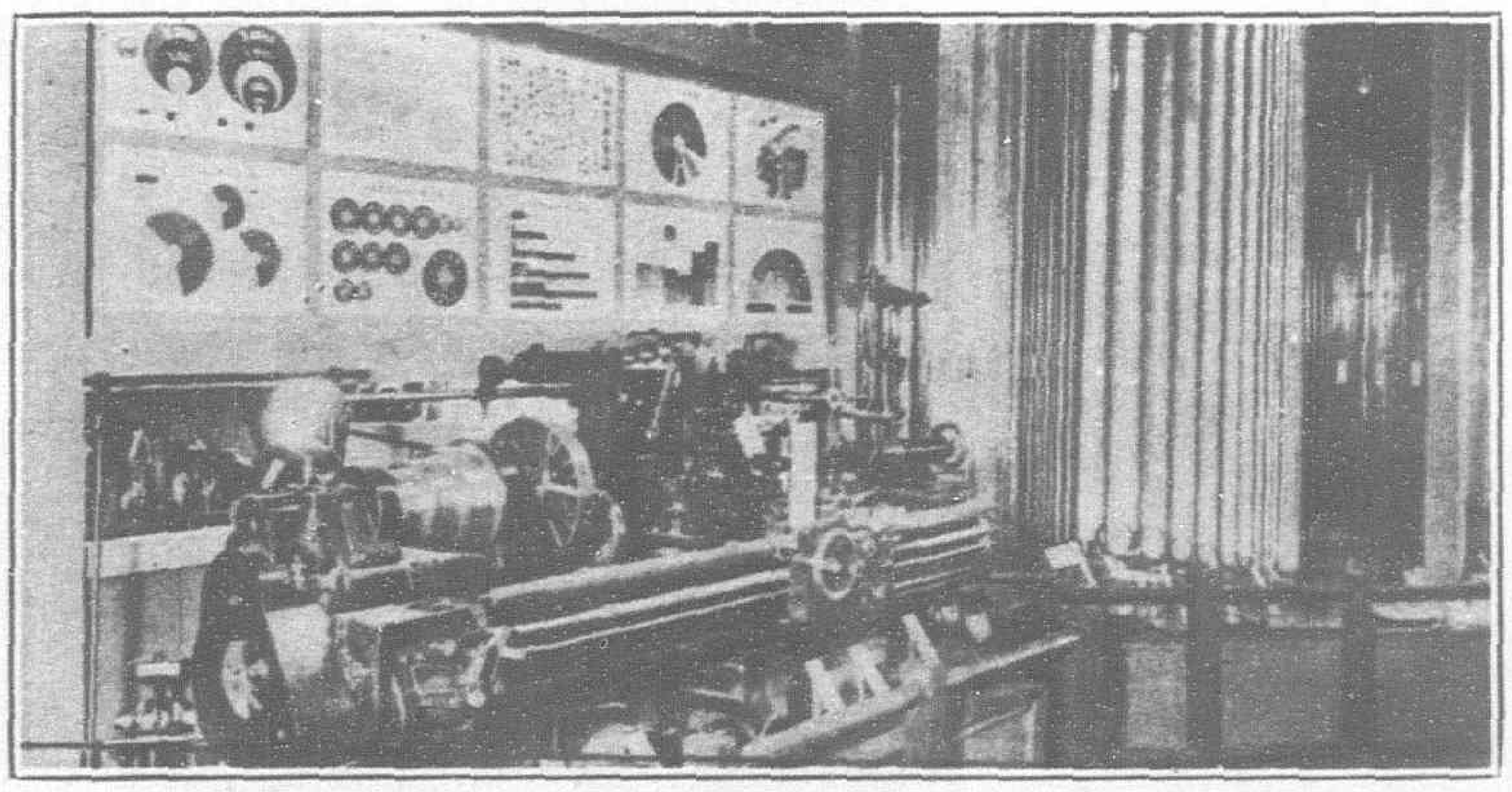
The Magnificent Gothic Edifice housing the Sumitomo Exhibits



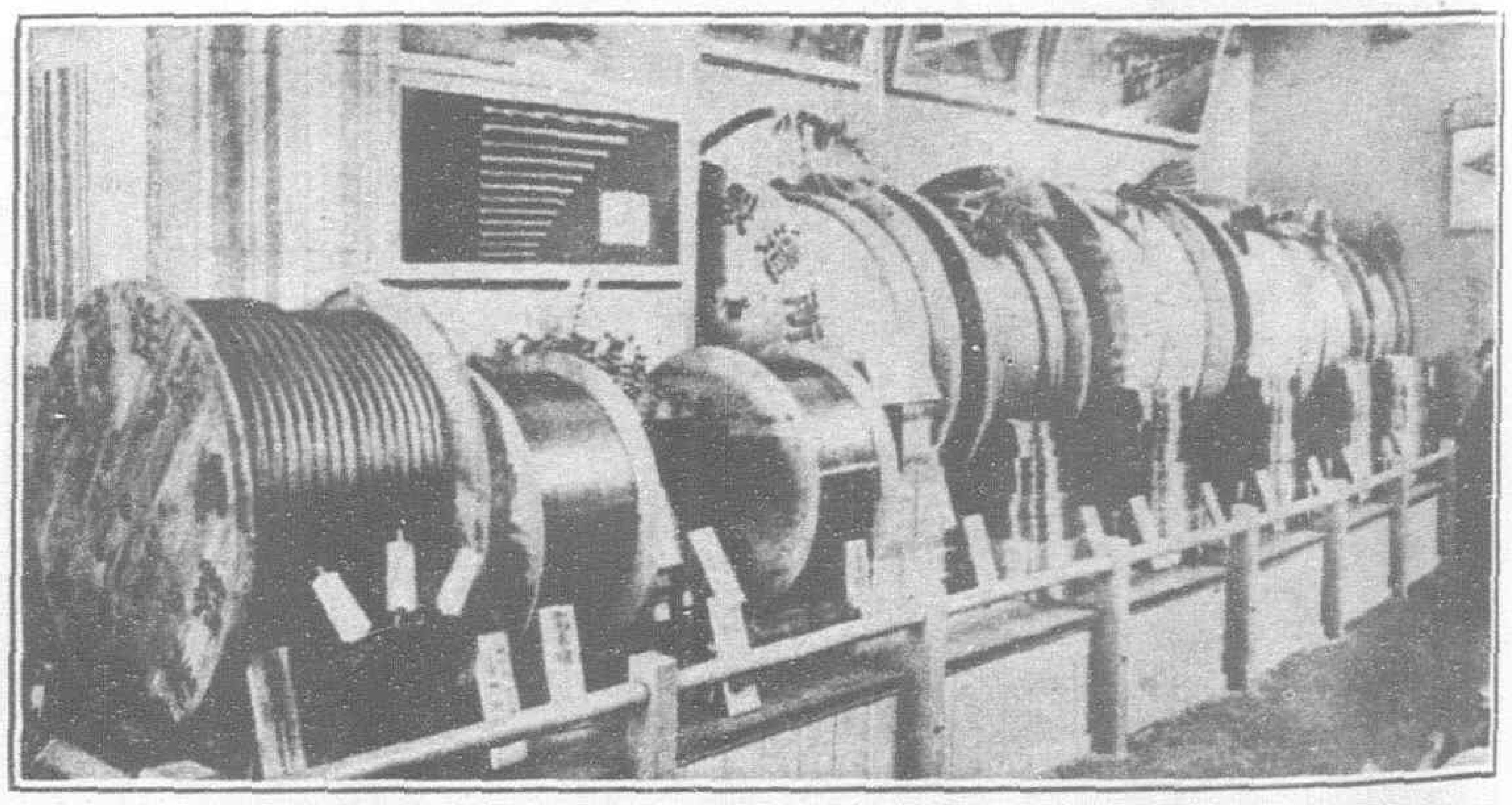
Products of the Sumitomo Steel Works. Rudder Frames, Piston Rings, Anchors, Shafting, Guns, etc.



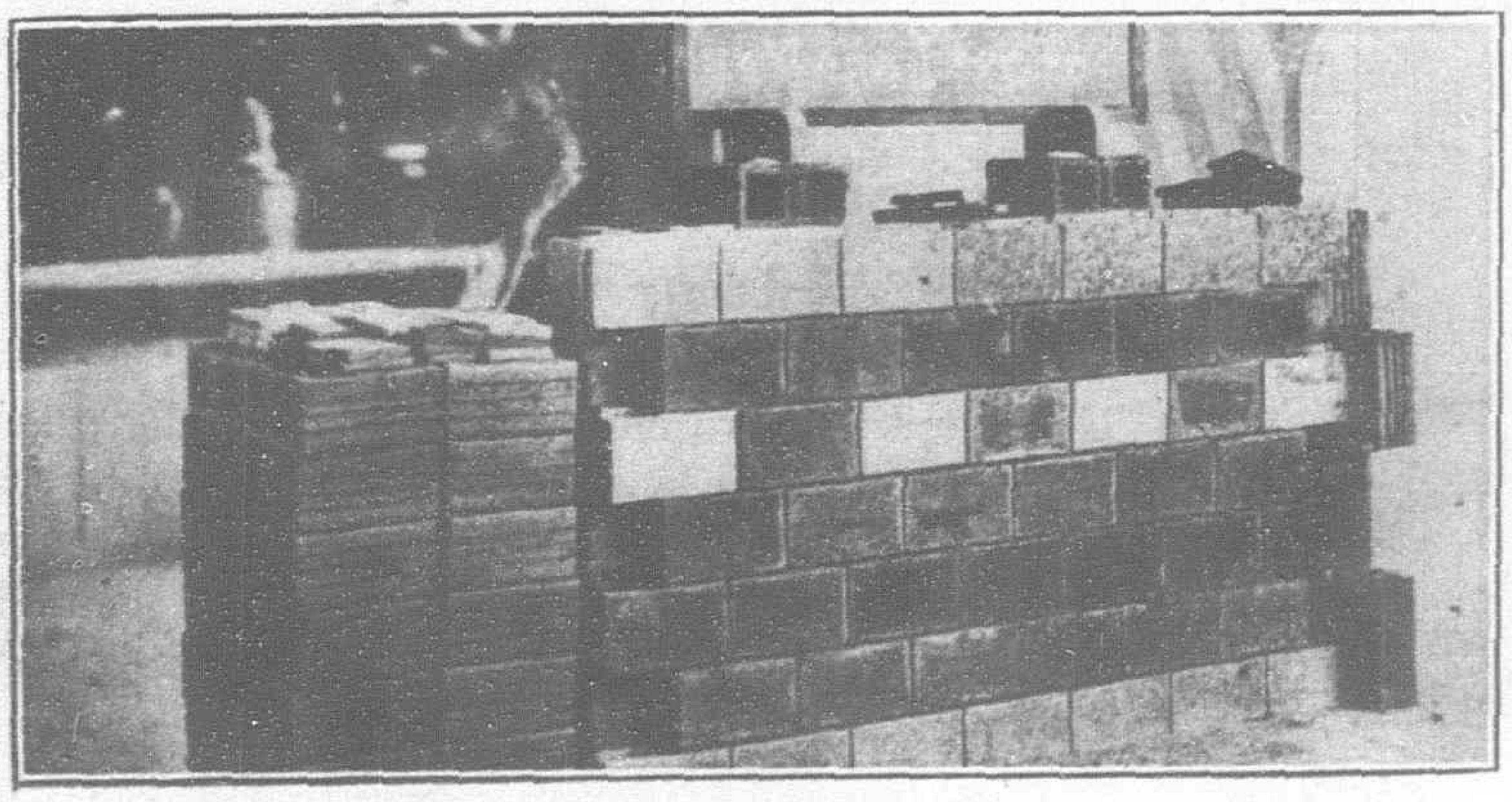
Steel Transmission Towers, Boiler Tubes, etc.



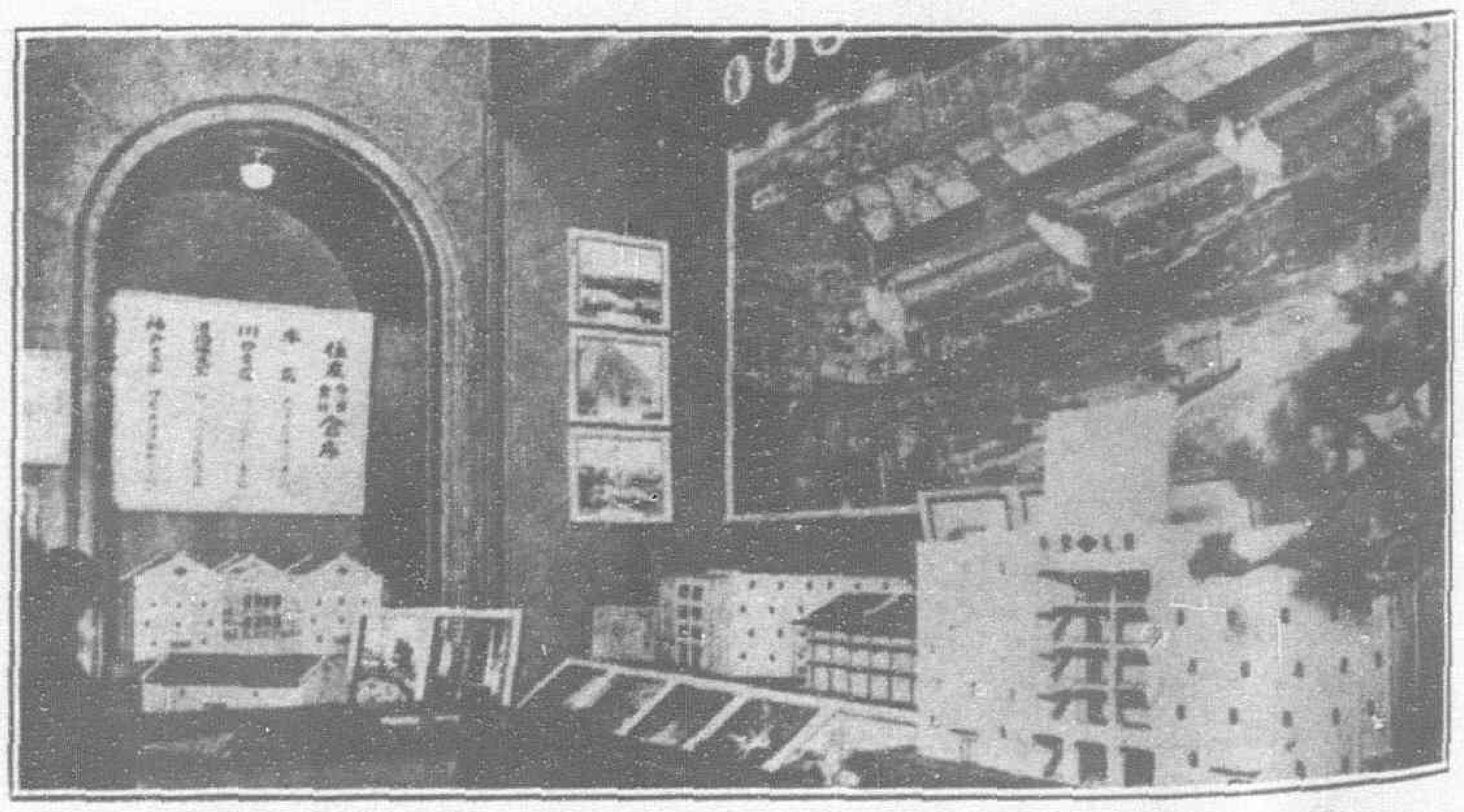
Precision Tools, Lathes, Copper and Brass Rods, Tubes, etc.



Copper Wire, Insulated and Armoured Cables, etc.



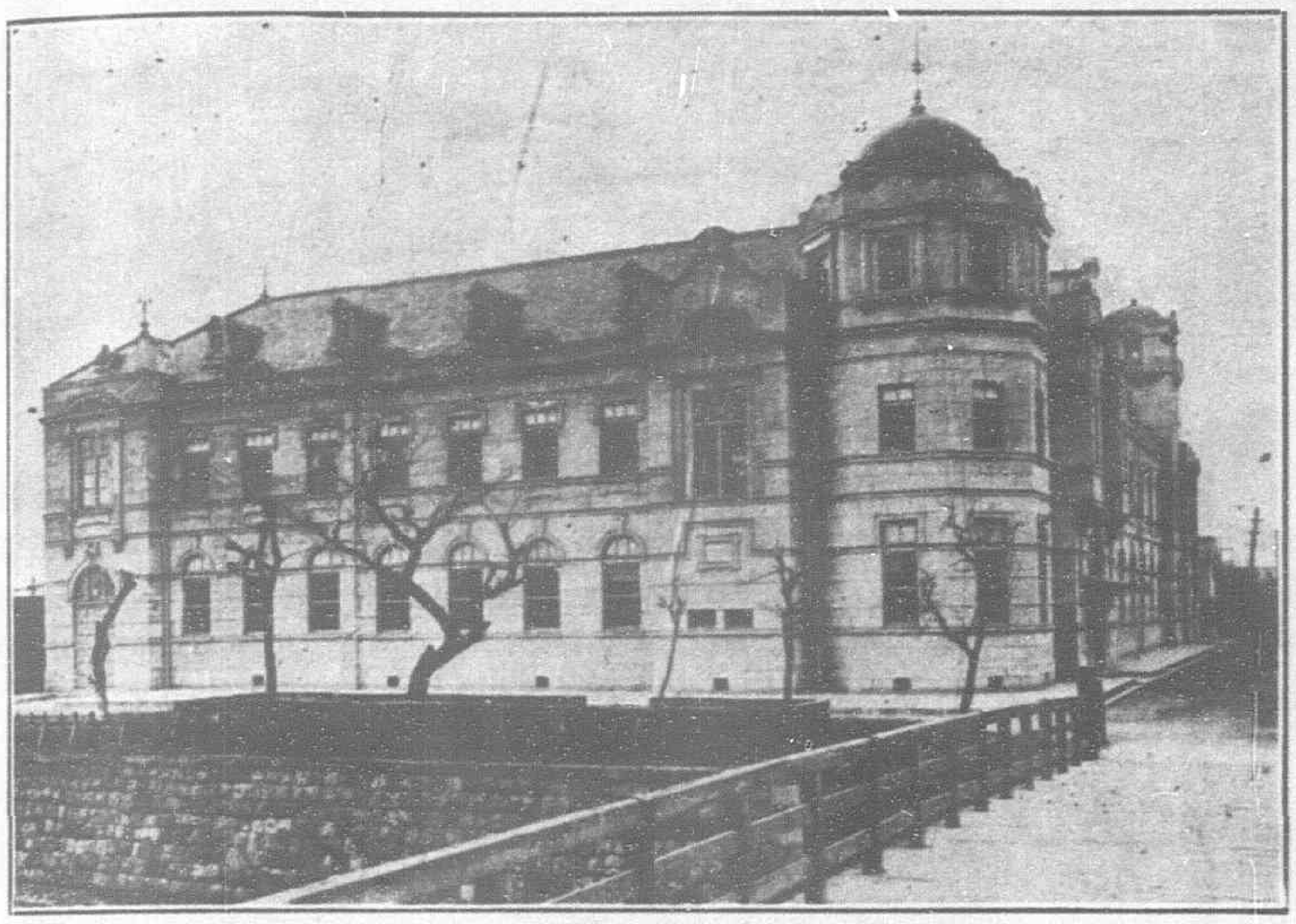
Hollow Tiles



Warehouse Exhibit, showing models of new Warehouses under Construction in Osaka

All warehouses are first-class brick of fireproof concrete buildings, safely and conveniently situated. The business enjoys unparalleled prestige,

Its Kobe and Kawaguchi branches are largely given up to bonded and private warehouses for the Kobe and Osaka customs houses. It has recently established its own warehouses near the Osaka harbor pier in order to facilitate storing or re-packing imported and exported goods. The stocks in warehouses at the end of May 1922, were valued at Y.80,430,930.



Sumitomo Head Office and Bank, Osaka

The branch warehouses are: (1) Kawaguchi branch in Kita-ku Osaka; (2) Dotombori branch, Nishi-Ku, Osaka; Kobe branch and the Tokyo branch.

Sumitomo Copper Works

Ajikawa, Osaka

Mr. J. Matsumoto, *General Manager.*
Mr. I. Fujimoto, *Manager.*

The Works, established in 1897, covers 13.61 acres, 6.66 acres of which is occupied with sheds and shops and employs 3,700 hands.

The Works are divided into six departments :—

(1) Foundries; (2) Sheet and Plate Mill; (3) Tube Mill; (4) Bar Mill; (5) Steel Tube Mill; (6) Testing Department.

1. Foundries.—The foundries supply the shops with various ingots. Long experience on the part of the skilled staff enable the Works to depend on reliable materials for its products.

2. Sheet and Plate Mill.—The Mill turns out sheets and plates of copper, zinc, brass, yellow metal, naval brass, manganese bronze, phosphor bronze, aluminium, German-silver and many other metals. It has an up-to-date and improved mechanical equipment which is laid out on such a scheme and plan as to ensure economy in working. It produces all kinds and sizes of sheet and plate for all purposes furnished in hot or cold rolling process. Heavier plates for locomotive and marine engines are also rolled.

3. Tube Mill.—The Mill is the pride of the Works. Its manufacturing facilities are not only of dimensions that have no rival in Japan but rank among the best mills of the world. Refinements of technique have been achieved; intricacies in engineering have been mastered; and a special process has been invented and installed with no small success. The seamless tubes there made are light in weight and are strong against breakage. The copper, and condenser tubes are approved by the imperial Japanese navy.

4. Bar Mill.—The Mill is well furnished for the production of bars, rods and other metal of various forms and shapes to order. They are finished exact to required size and shape with a perfectly smooth surface free from cracks, spills or any other defects.

Blading materials for steam turbines were produced at the Works' mill for the first time in Japan about six years ago. Since that date, with much effort and endeavor the Mill has succeeded in originating and adopted a special process of production which has enhanced its business.

5. Steel Tube Mill.—For seamless tubes, the Mill is equipped with its own process of manufacturing, by which means steel bloom is first pierced, rolled and drawn to the length and diameter required. The tubes are finished into a uniform thickness, and perfectly smooth both inside and outside throughout the whole length. The consequent absence of longitudinal seams makes the tubes very strong and durable. They are supplied to the Imperial Japanese navy, railways and private shipyards.

6. Testing Department.—To reinforce the expensive factory equipment, the Works has a well-equipped chemical and physical laboratory where all the problems incident to the solution of every difficulty encountered are handled by thoroughly reliable experts and by modern methods. All raw materials are tested and inspected here, before they are sent out to each mill. With these facilities at its disposal, the Works is enabled to meet the severest specifications and to give to the users of its products a standard of quality that always ensures their entire satisfaction.

Sumitomo Electric Wire and Cable Works, Ltd.

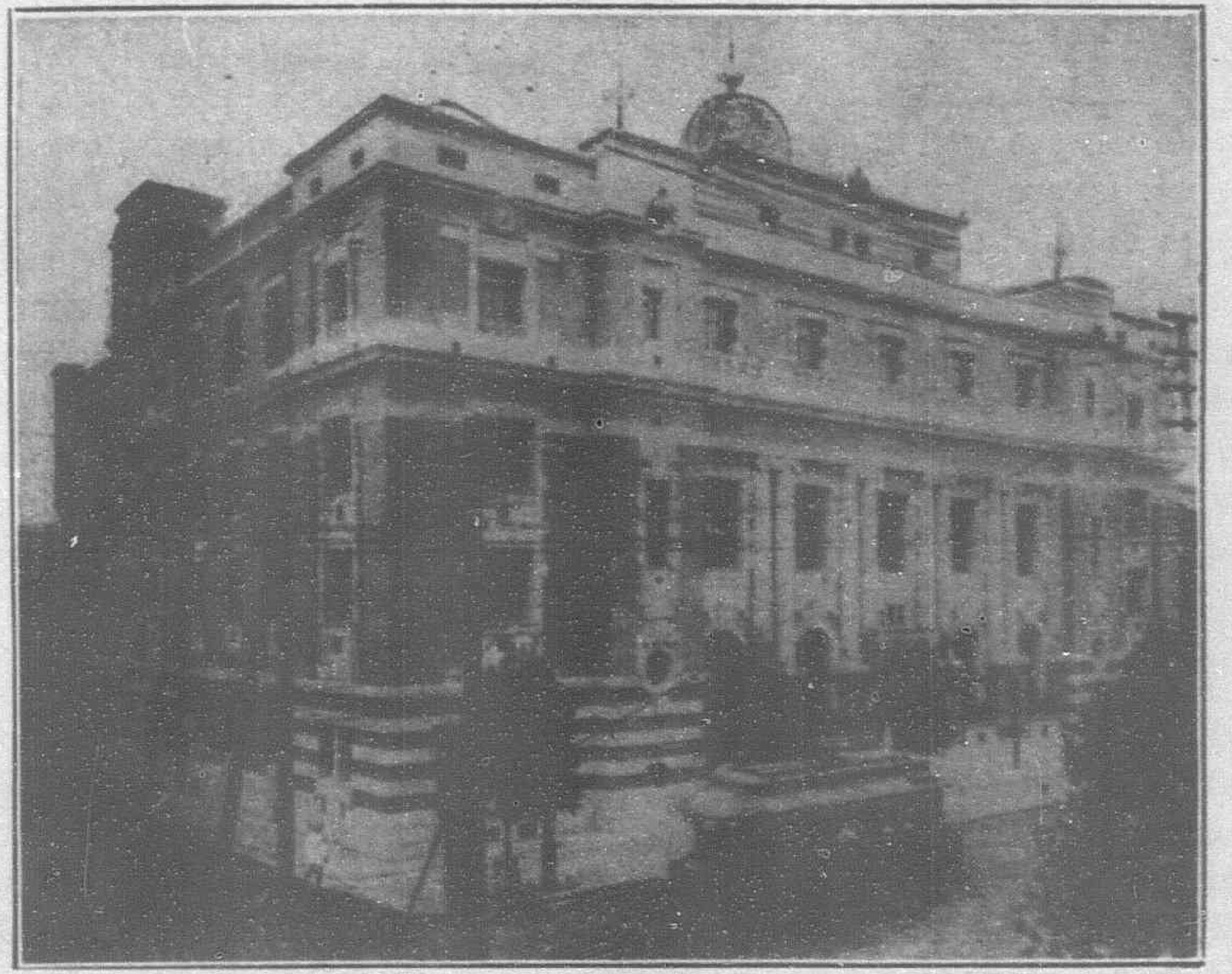
Okijima, Osaka

Managing Directors: Messrs. Yasuo Riko, Dr. Eng., and Denichiro Nishizaki.

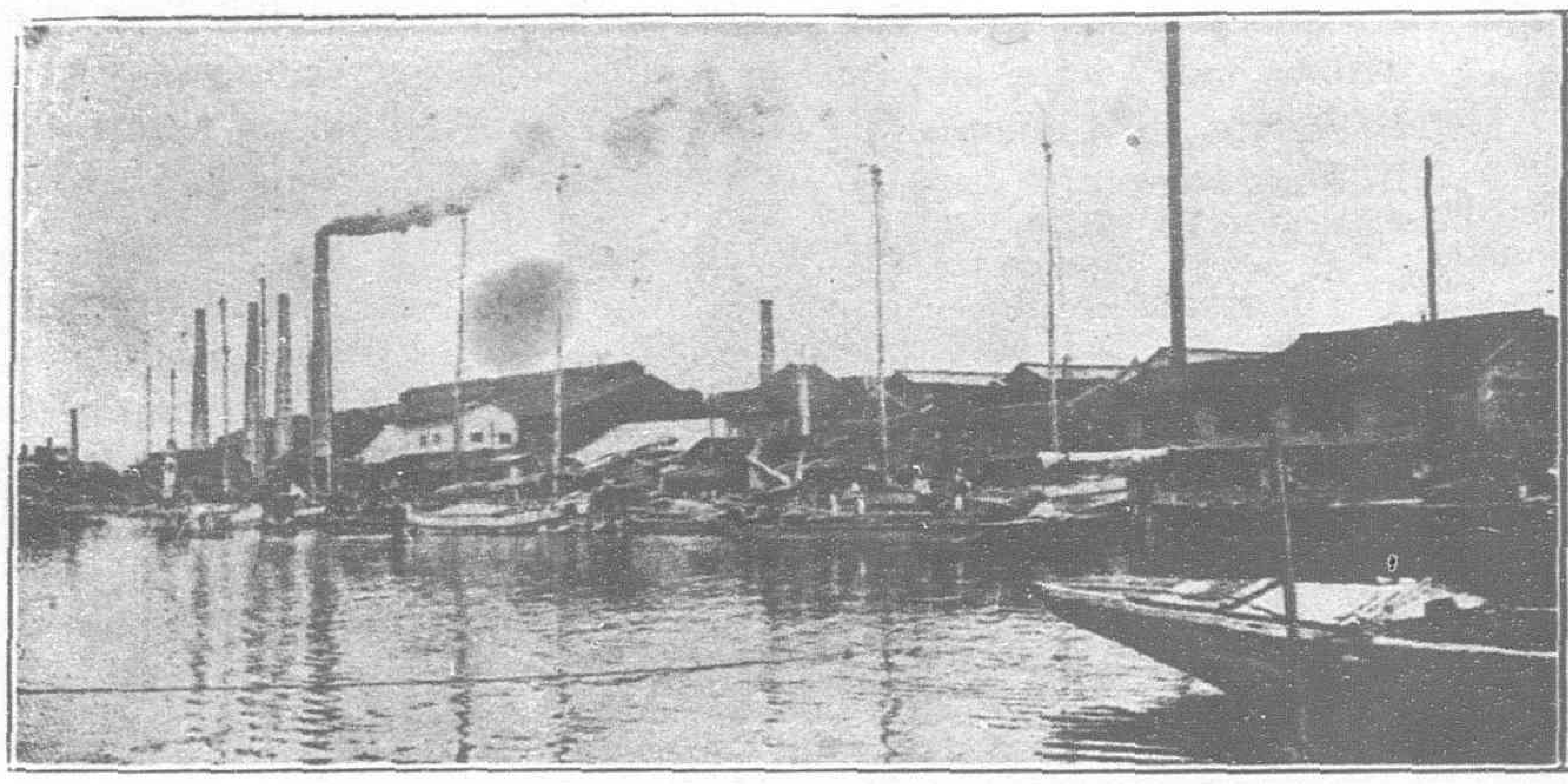
The Sumitomo Electric Wire and Cable Works is in itself the most efficiently equipped electric wire and cable factory, east of Suez. Though its history is a comparatively new one, for it was first established in 1908, the Works, controlled by experienced hands, has turned out the first paper cable made in Japan.

Since that date, in every branch of electrical engineering, great changes and advances have taken place only to be accompanied by a corresponding growth in the manufacturing facility of the Works. In its present buildings, which have been occupied three years, modern and up-to-date improvements in the manufacture of all sorts of wires, bare and insulated, have been invented and are in use. In fact, it is the only Works in the line where the system of "standardized production" has been introduced with great economy in the cost of production,—a fact which is demonstrated by its prosperity, and is well endorsed by the general satisfaction and appreciation shown with regard to its standard of quality in the markets, at home and abroad.

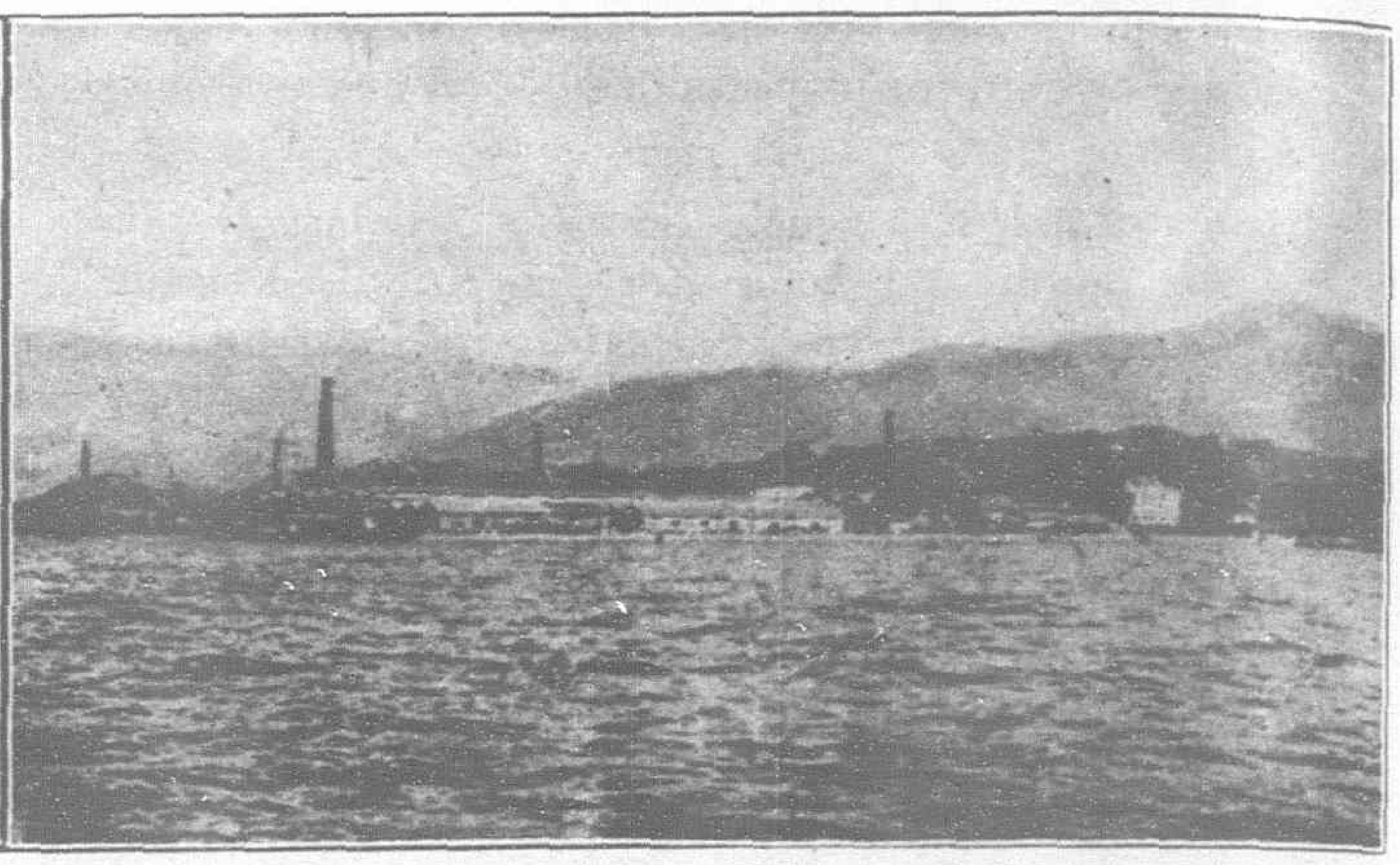
Its scope of manufactures ranges from bare wire and cable to all kinds of insulated conductors.



The New Tokyo Branch of the Sumitomo Bank



Amagasaki Branch Works, for making wire nails and galvanized wire.



Sumitomo Fertilizer Factory at Niihama

1. Bare Wires and Cables.—Plain or tinned, hard- and soft-drawn, copper wires. Copper tapes and bars. Round or grooved trolley wires. Brass, silicon and phosphor bronze wires. Aluminium wires. German-silver wires. Stranded wires of every description.

2. Insulated Wires and Cables.—(*a*) Rubber insulated wires and cables; electric-light, power, telephone and telegraph wires and cables; (*b*) paper insulated cables; underground power cables, dry-core and telephone and telegraph cables; (*c*) varnished-cambric insulated cables; (*d*) cotton and silk covered wires; all kinds of instrument wires, weather-proof aerial wires and cables; (*e*) lighting flexibles; (*f*) paraffined wires; (*g*) vulcanized bitumen cables; (*h*) enamelled wires.

3. Cable Accessories.—The rapidity with which the plant and business have evolved finds hardly a parallel elsewhere. The number of the workmen employed in 1911 was no more than 180, which has been increased at a bound to 2,000 during these six years. Its sphere of business activity now includes India, Java, Australia, Russia, China, Italy, Canada, etc.

Sumitomo Fertilizer Manufactory

Niihama, Iyo

Mr. Kamajiro Kajiura, *Manager.*

The manufactory covers 20 acres, 7 acres out of which is covered with various shops and store-houses.

Its manufactures are; (1) Sulphuric acid; (2) nitric acid; (3) superphosphate; (4) compound manure; (5) complete manure.

The annual output is about 12,000,000 *kwan* of sulphuric acid; 2,000,000 bags of super-phosphate; 1,000,000 bags of compound fertilizers.

Though one of the youngest among the firm's enterprises, its products are well known in all eastern markets. Among its export markets are Australia, India, South Sea Islands, Russia, Philippine Islands, etc.

The equipment of the plant has been chosen out of many European improved patterns. To reinforce this matchless factory, the firm's Besshi Mine offers abundant pyrite for manufacturing different kinds of fertilizer of superior quality. Pyrite from the copper mine enables the factory to produce more phosphate than any other chemical fertilizer works in Japan.

Sumitomo Steel Works, Limited

Shimaya-cho, Osaka

Baron Kichizaemon Sumitomo, president; K. Nakada, chairman of the board; J. Matsumoto, managing director; T. Sumitomo, M. Suzuki, K. Yukawa and S. Kato, directors; S. Kato and J. Kawada, managers,

The Sumitomo Steel Works was the first to set up in Japan in its line of business, producing steel castings with one 15-ton acid process; steel forging with four basic Siemen's furnaces, the total capacity being 68 tons and with hydraulic presses 2,000 tons, 1,600 tons and 600 tons respectively. Its products comprise:

1. Case steel crossings, turns, wheels, etc., for railways, collieries, mines, etc.
2. All of essential parts of marine boilers and engines, propellers, propeller-blades, anchors, marine steering gears and all sorts of things for ships and steamers.
3. Rollers for iron, copper and brass mills.
4. Hydraulic cylinders, etc.
5. Yokes for electric dynamoes, etc.
6. Gearings with straight or helical teeth.
7. Dredgers, buckets, etc.
8. All machinery parts that require the strongest strain.

All these products of the Works have Lloyd's certificate for reliable quality, and many other awards of merits conferred at the various exhibitions, both at home and abroad. A factory for steel rollings is now under construction. Annual melting capacity of the Siemens-Martin furnace is 20,000 tons of acid and 20,000 tons of basic steel.

The Sumitomo Bank, Ltd. (Successors to the Sumitomo Bank)

Head Office: Kitahama, Osaka.

Capital: Y.70,000,000; Paid up: Y.40,000,000; Reserve: Y.12,000,000.

Officers and Directors: Baron K. Sumitomo, president; Messrs. K. Yukawa, T. Kanoh, S. Yoshida and N. Yatsushiro, managing directors; M. Suzuki, K. Nakada and K. Hori, directors; T. Hamazaki, manager, head office. Chief shareholders: Baron K. Sumitomo, 153,720; Messrs. M. Sumitomo, 18,000; A. Sumitomo, 5,400; K. Sumitomo, 5,400; K. Sumitomo, 3,000; M. Suzuki, 2,500 and T. Sumitomo, 2,000.

History.—Established in March, 1912. The Sumitomo Bank, one of the largest commercial and exchange banks of Japan, can be said, in a broad sense, to be older by four years than the Bank of England, having as its origin the Sumitomo firm, established in 1690. In its early days, the Sumitomo firm advanced loans to the Daimoyos under the Shogunate, and merchants of the city of Osaka which was then gaining its prominent position as the centre of commercial and industrial Japan. In 1895, the firm organized its old general financial business into a modern banking system with a capital of one million yen under the title of "Sumitomo Bank." Since December 31st, 1895, the bank has made steady progress, as may be seen from a statement on next page.

Dec. 31st		Deposit.	Loans.	Reserves.
1895	..	Y. 882,000	Y. 2,142,000	Y. —
1899	..	7,486,000	8,164,000	850,000
1903	..	19,468,000	16,220,000	1,950,000
1907	..	32,596,000	26,539,000	3,400,000
1911	..	44,348,000	35,391,000	4,800,000

The private bank was converted into The Sumitomo Bank, Ltd., in April, 1912.

Dec. 31st		Deposit.	Loans.	Reserves.
1912	..	Y. 51,937,000	Y. 43,909,000	Y. 200,000
1915	..	86,123,000	75,014,000	1,100,000
1917	..	187,620,000	163,677,000	2,100,000
1918	..	269,250,000	251,700,000	4,100,000
1919	..	348,359,000	345,582,000	6,500,000
1920 (Jan. 30th)		359,764,000	375,155,000	12,000,000

Many important branches were established, and the foreign exchange department opened in 1905, with numerous correspondents in the principal centres of the world. In 1912, it was incorporated as a joint stock company and its capital brought up to Y.15,000,000, the greater part being subscribed by the Sumitomo family. In July, 1917, the capital was further increased to Y.15,000,000 and in April, 1920, another increase to Y.40,000,000 was decided on, and public subscription invited, with great success each time. At present, with a capital of Y.70,000,000 and 2,327 shareholders it occupies a foremost position in the banking system in Japan, with branches in London, New York, Shanghai, Honolulu, Seattle, etc.

Shanghai Office of the Sumitomo Bank and Sumitomo Goshi Kaisha

China Offices

Distributing and sales offices for the Sumitomo products in Central China were opened in Shanghai in November 1916. Since then this office has taken over the agency of the Fuso Marine and Fire Insurance Company and handles the Sumitomo investments in Chinese industrial and mining enterprises. This office is under the direction of Mr. C. Fukuda. A fine new building has since been erected in Kiukiang Road in the heart of the business district which houses the Sumitomo Bank and the commercial departments. A Tientsin branch is maintained at 42 Rue du 14 Juiellet under the management of Mr. S. Sakamoto and one at Hankow directed by Mr. T. Kubota.

Yangtze Commission

Preparing for Mr. Palmer's Visit

Mr. George G. Stroebe has been engaged by the technical committee of the Yangtze river commission to survey the Yangtze River preparatory to the improvement of this great waterway of China. A party consisting of Mr. van der Veen, a member of the committee, Mr. T. C. Shoung, chief secretary of the commission, and Mr. Stroebe, in the capacity of the chief survey engineer, left Peking for Hankow to make a study of the river. They will go down the river from Hankow to Shanghai, and at Nanking will be joined by Mr. Yang Pao-ling, another member of the committee.

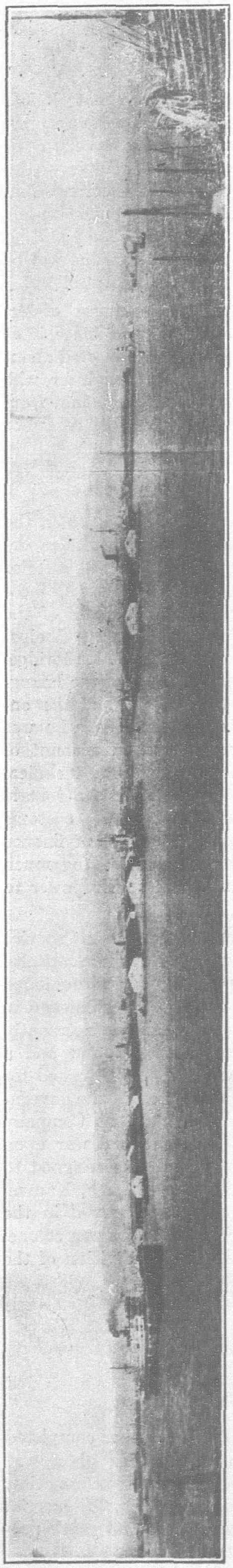
An office will be established at Shanghai, in charge of Mr. Stroebe, to carry on the survey work, and the head office is at Peking. After sufficient hydrologic data have been collected about the river, Mr. F. Palmer, the world-known hydraulic engineer, who made a trip to this country last year, will come out again from England to study the river and give his expert opinion with regard to the improvement of it. The importance of collecting enough data upon which a comprehensive scheme of improvement can safely be based is generally admitted.

The technical committee of the commission under which the survey work will be undertaken was organized in May. Its members are Mr. H. van der Veen, adviser to the ministries of the interior and communications; Mr. Yang Pao-ling, a well-known Chinese hydraulic engineer; Mr. H. von Heidenstam, chief engineer of the Huangpu conservancy board; Mr. Chow Zian-yien, principal technical expert of the ministry of the interior; Capt. T. J. Eldridge, customs coast inspector; Mr. Sun Ping-wang, chief of the Kianghuai surveying bureau; and Mr. Chen Shih-li, chief of the engineering department of the ministry of the interior, who was unanimously elected chairman of the committee on account of his experience and seniority. All of these members are technical men of recognized ability. Sir Francis Aglen, inspector-general of customs, Mr. Sun Pao-chi, director-general of the customs administration, and Mr. Kao Ling-wei, former minister of finance and minister of the interior, have given the undertaking much encouragement, and have done everything within their power to make it a success.

Mr. Stroebe has been in the Philippines government service for more than 12 years as hydraulic engineer, in which capacity he designed irrigation, river and harbor works, and a municipal water supply. He graduated from the University of Chicago in 1900 and the University of Michigan in 1904, and subsequently taught civil engineering in the latter university for four and a half years. Before going to the Philippine Island he worked for the United States reclamation service, which does all the government irrigation work, and also for the Canadian British Company as bridge designer. When the United States declared war upon Germany, Mr. Stroebe enlisted immediately and was assigned to the engineer officers' training school at Fort Leavenworth, Kansas. He was commissioned captain of engineers, and served in the Philippine Islands, where, at the close of the war, he was colonel of the regiment of engineers of the first Philippine division of the United States army.

Japan to Make Tin Plate

The Imperial Steel Works at Yawata, Japan, has completed construction of its plant for making tin plate. This plant was erected with a view to checking imports of tin plate from America. Its estimated annual capacity is 20,000 tons, although, Commercial Attaché James F. Abbott reports from Tokyo, the first year's production is not expected to exceed 6,000 tons.



View of Kobe Harbor Improvements taken from Harbor

Port of Kobe Improvements

By K. Morigaki, Chief Engineer

THE port of Kobe (Hyogo harbor) is situated in the southwestern part of Settsu province twenty miles from Osaka and embraces Kobe and Hyogo bays. It faces south and is sheltered on the north by the Rokko mountain range which rises two miles from the coast. In olden days Kobe was a straggling fishing village, but after the building of the Osaka castle in 1583 (the 11th year of Tensho) by Toyotomi Hideyoshi it grew in importance as a distributing centre.

On the 7th of October, 1867 (3rd year of Keio), the opening of Hyogo harbor for foreign trade was sanctioned by imperial decree, and in the following year, 1868 (the first year of Meiji), two Unjosho (excise offices), east and west, were established, and four piers and three warehouses, were constructed constituting the first accommodations for foreign trade in Kobe.

In 1873 (the 6th year of Meiji) the Unjosho were renamed, "The Customs." Since that time the wharves, piers, warehouses and sheds have been improved and added to year by year. By 1901 (the 34th year of Meiji) eight warehouses, fourteen sheds and nine cranes had been erected on Wharves No. 1 and 2 and the Onohama wharf. In addition, Kawasaki, Hyogo and No. 4 wharves had received noticeable improvements. The following year, 1902 (the 35th year of Meiji), the two breakwaters, one 600-ft. long to the east and the other 660-ft. long to the west, off Onohama, were completed.

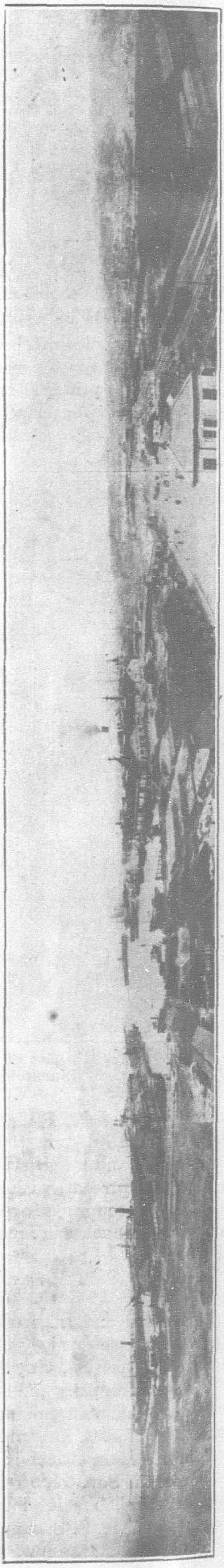
Foreign trade in Kobe has developed by leaps and bounds and at present Kobe is universally regarded as one of the largest trading ports in the Far East. The following table shows the progress of Kobe trade every fifth year since 1873 :—

Exports and Imports

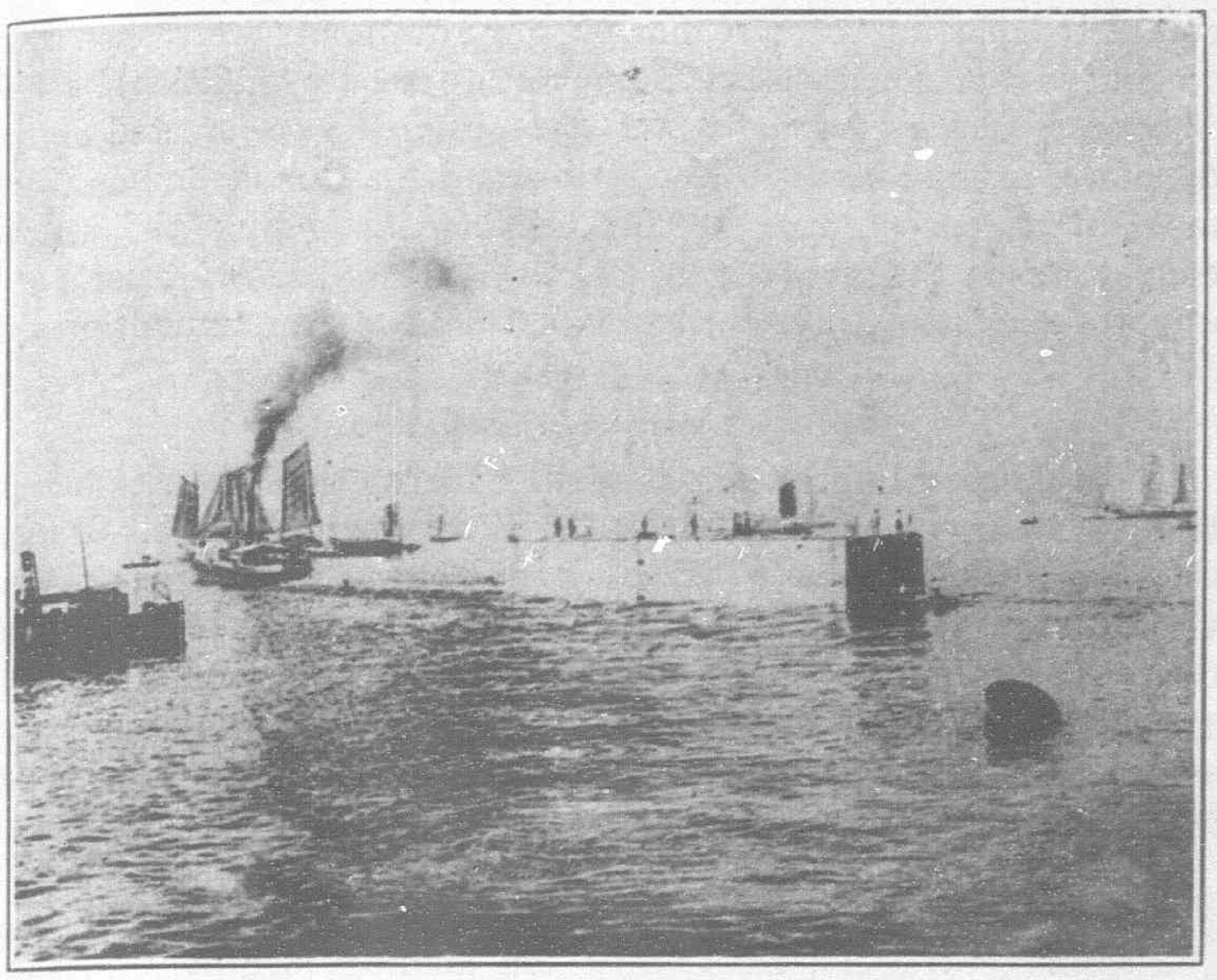
Year		Values of Exports and Imports	Increase compared with previous year	Percentage increase
		Yen	Yen	Bales
1873	..	8,441,869	—	—
1878	..	12,531,535	4,089,666	85
1883	..	12,961,841	430,306	3
1888	..	42,971,975	30,010,134	211
1893	..	66,263,250	23,291,275	54
1898	..	198,253,442	131,990,192	191
1903	..	245,052,228	46,798,786	24
1908	..	275,195,639	30,143,411	12
1913	..	522,727,527	247,231,883	14
1918	..	1,352,482,464	830,054,937	32

From the above it will be seen that the rate of progress of exports and imports combined, at the end of every fifth year, shows an average increase of about seventy per cent.

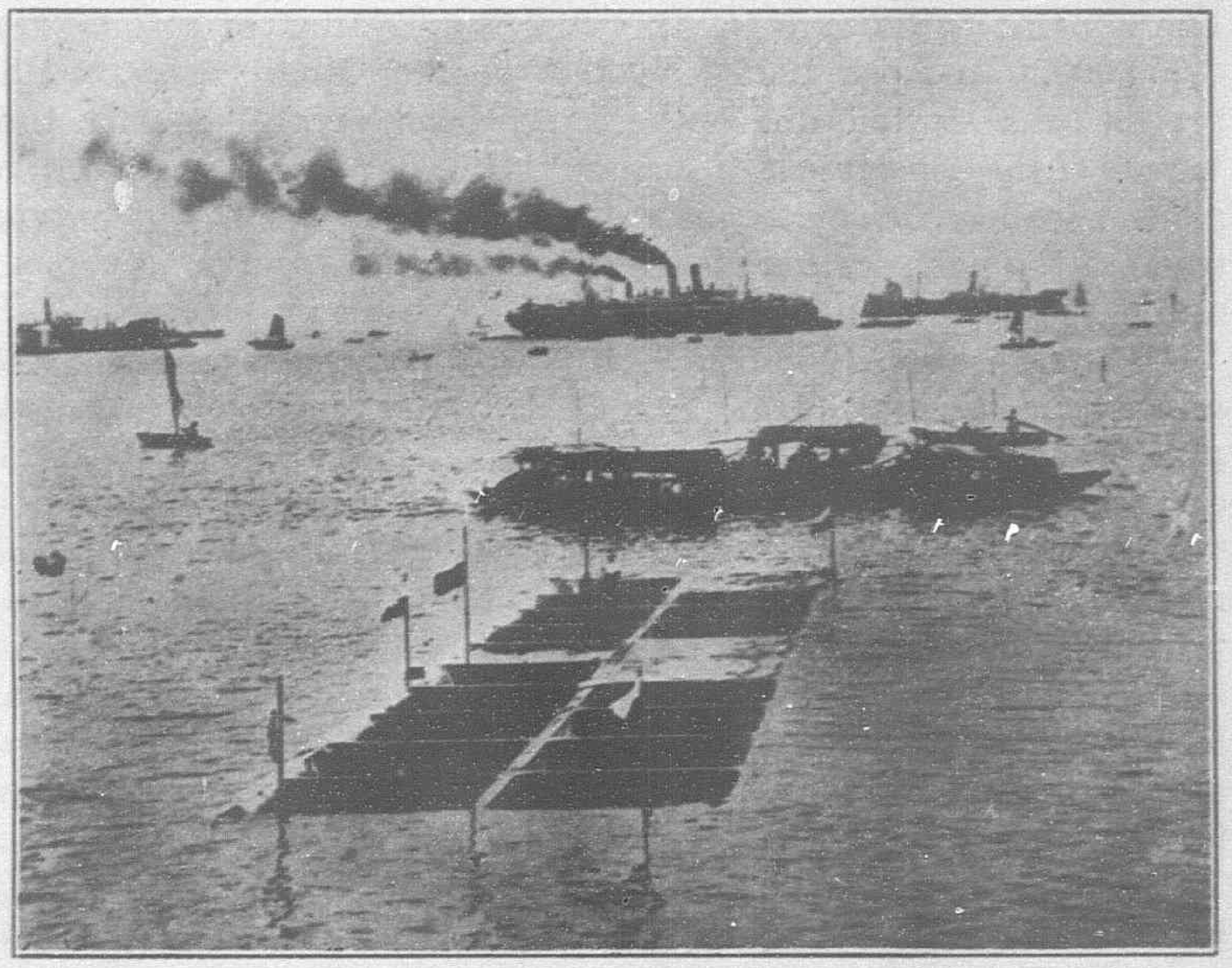
The prevailing wind of the port comes from the north, but because of the shelter afforded by the Rokko range of mountains, it does not interfere with shipping in the harbor. In winter westerly winds sometimes visit the port but owing to the geographical position of Wada point they are not harmful. However, during the summer months southerly and easterly winds visit the port and these winds sweeping over the large expanse of open water between Kobe and Osaka frequently cause damage to the small craft in the bay. In spite of this, records show that operations in the harbor are never suspended, owing to rough water, more than twenty times during a year.



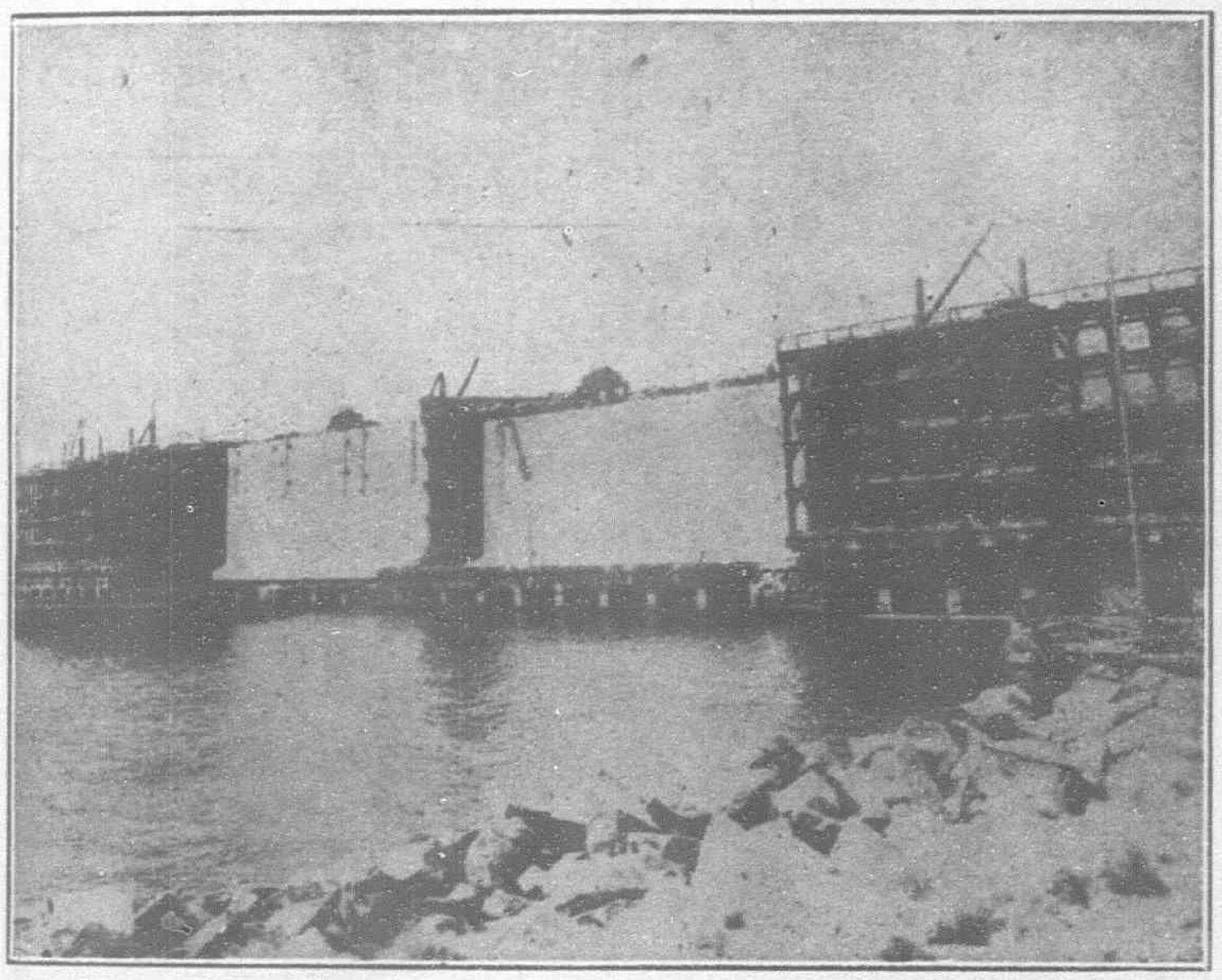
View of Improvements from Customs Compound



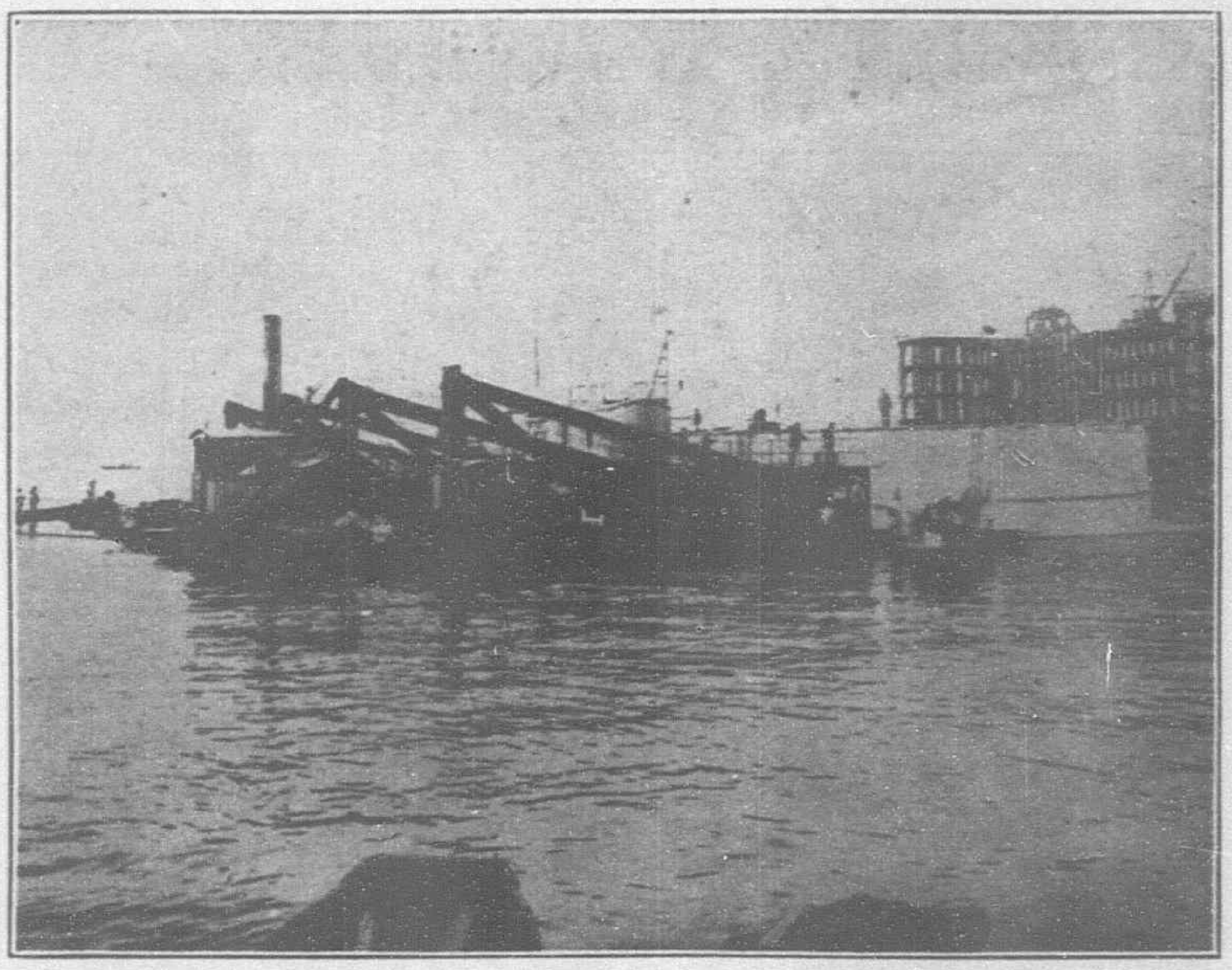
Caisson Towed to its Site



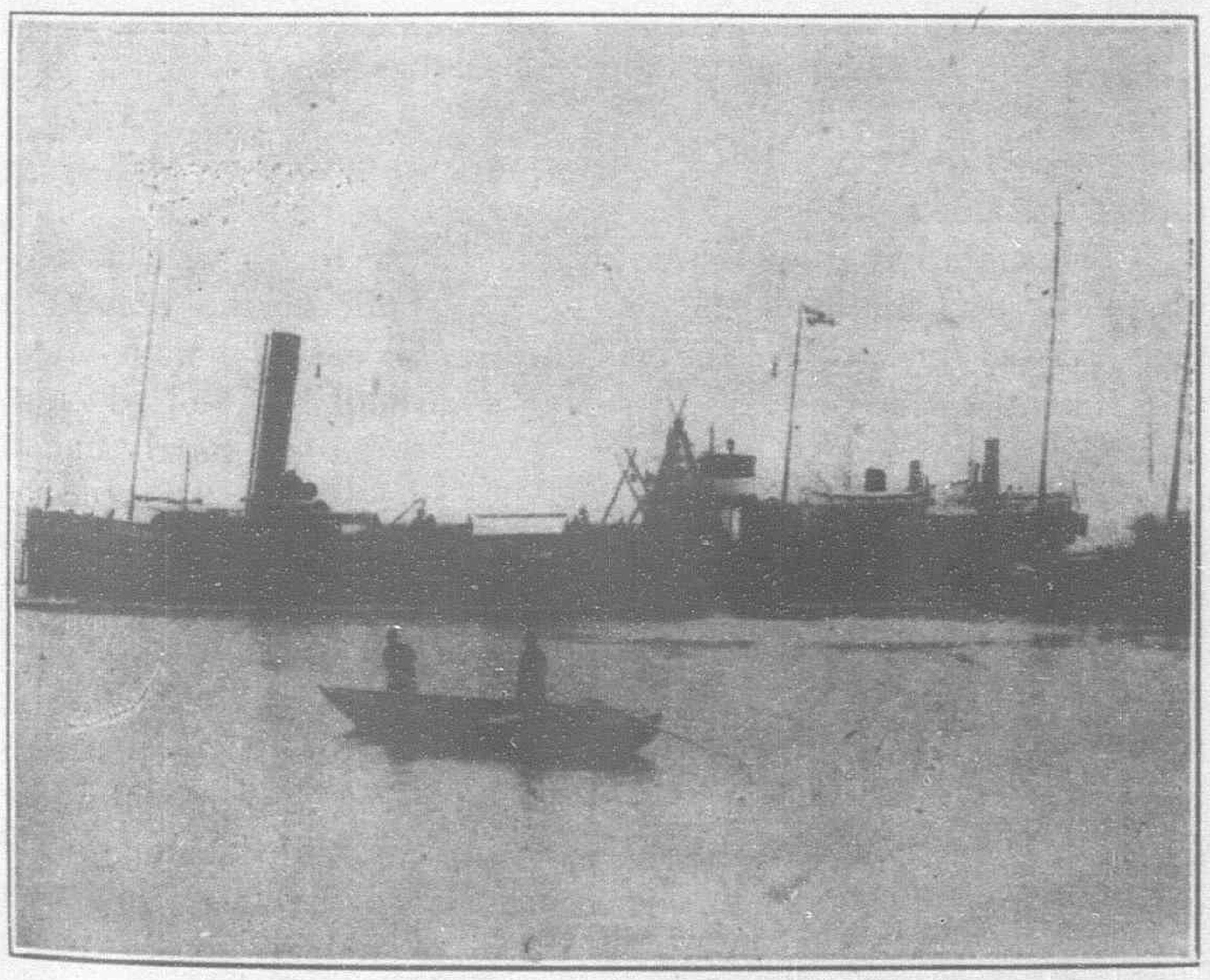
Caisson Being Deposited



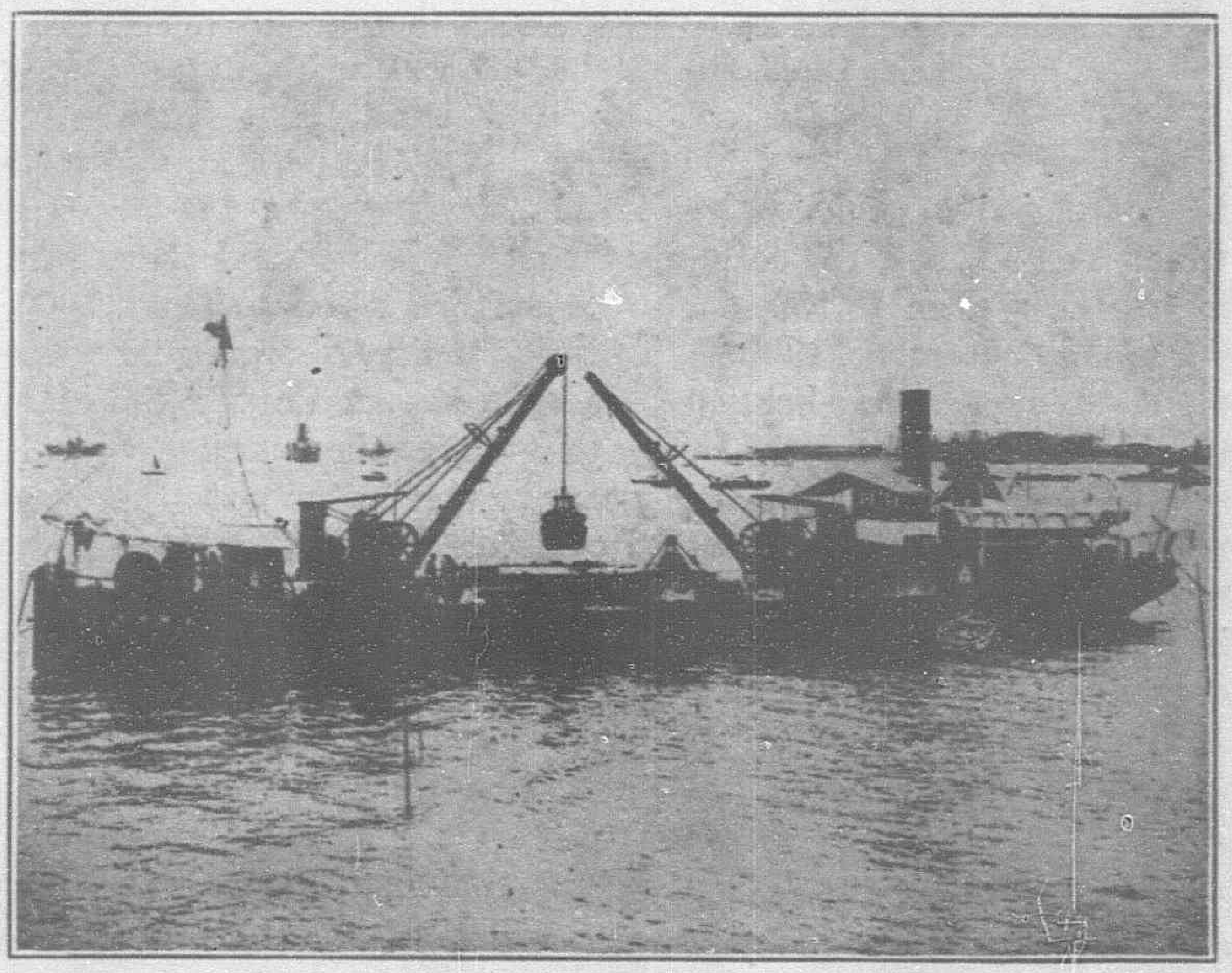
Ferro-Concrete Caisson on the Casting Pier



Caisson Leaving the Depositing Dock



Sand Pump Dredger "Dokai Maru" at Work



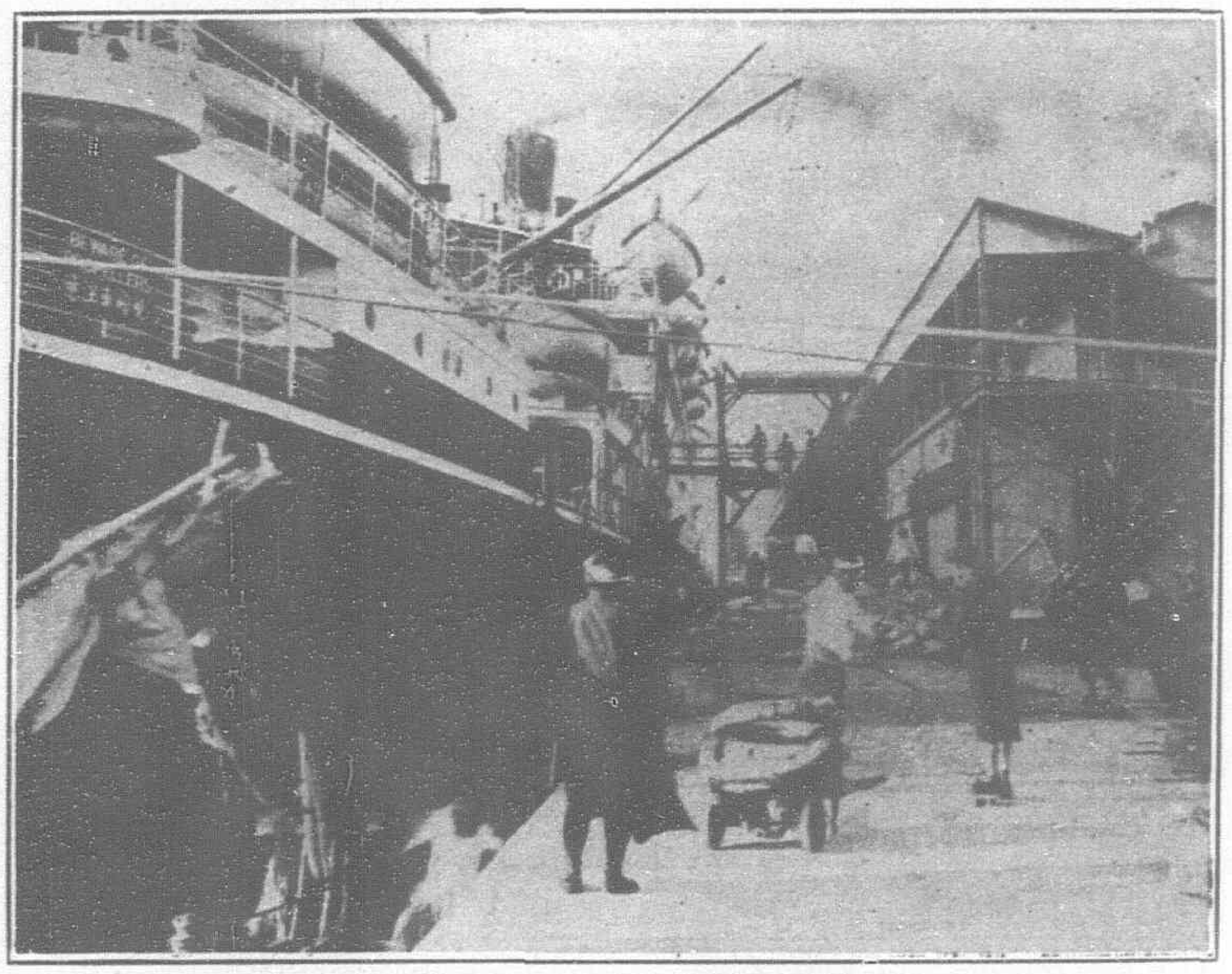
Priestman Dredger "Owada Maru" at Work

The harbor which is deep with a slightly slanting bed has no stream carrying alluvial deposits into the harbor and consequently the bottom, consisting of mud and sand, affords a very safe anchorage. Kobe harbor itself is ideal from point of location, but because of the sudden tradal expansion of the port, the piers and terminals were soon found to be inadequate.

As a temporary measure to meet this sudden and rapid development of the port, plans were drawn up for a mole and a steel pier at Onohama to be built in six years at an estimated cost of Yen 3,960,000. In April 1906 (the 39th year of Meiji) work on this project was started under the supervision of the construction bureau of the department of finance. However, as these tentative plans were insufficient to meet the requirements of the increasing trade of the port, further changes were made for the improvement and extension of the harbor.

In September. 1906 (the 39th year of Meiji) Mr. Sakatani, the minister of finance, came from Tokyo and suggested a general plan of improvement. The city of Kobe being aware of the wonderful opportunities saw the necessity of these improvements and volunteered to bear a portion of the expenses incurred. The original plan of 1906 was altered to reclaim the foreshore from the projection of Onohama on the east, to the front of the former foreign concession on the west, providing thereby accommodations for the handling of 4,000,000 tons of cargo per annum. The plan also provided for the most modern improvements of facilities for the handling of sea and rail traffic between Kobe and Hyogo. The original estimated cost was to be increased to Yen 28,905,145, by a supplementary budget and in March, 1907, the plan was revised to divide the work into two sections.

FIRST SECTION.—Being most urgently required it was decided to construct first, the four wharves on the foreshore of the reclaimed ground at Ono at a total cost of Yen 17,099,407, with accommodations for handling 2,100,000 tons of cargo per annum and to be completed in eight years. This estimate (Yen 17,099,407 of which Yen 437,907 was borne by the city of Kobe) was the amount increased by Yen 13,139,407 to the original estimate (Yen 3,960,000). In September, 1907 (40th year of Meiji) elaborate commencement ceremonies were held at No. 1 mole attended by Mr. Sakatani, the minister of finance. From that time the work proceeded satisfactorily but it became necessary to extend the period in which these improvements were to be completed, and the scheme was modified. This was found necessary owing to the general advance in prices as a result of the great world war, and it was decided to complete the work in sixteen years, i.e., from the 39th year of Meiji to the 10th year of Taisho, at a total estimated cost of Yen 15,092,037 of which Yen 3,669,802 was to be borne by the city of Kobe.


Steamer Discharging at "A" Shed, Pier No. 1.

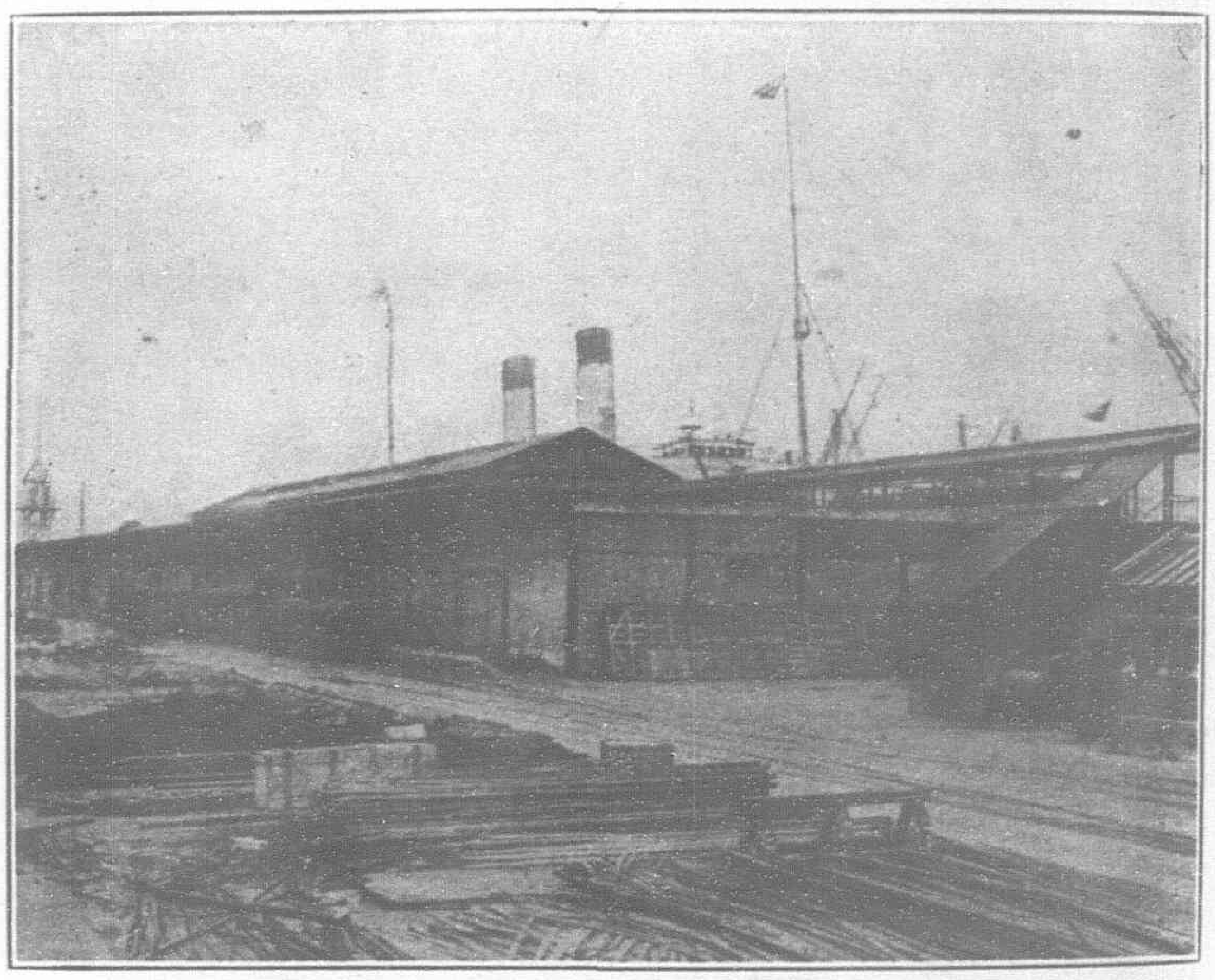
As a result of the war, exports and imports in Kobe increased suddenly, and consequently at the beginning of the 6th year of Taisho there was great need for government warehouses as well as private warehouses for storing imported goods. Lack of landing space made it difficult to land goods which had been discharged into lighters and the wharves became badly congested. This was of great inconvenience to importers and exporters but fortunately a completed portion of the harbor improvements were soon used to relieve the congestion. Moreover, to secure additional relief, temporary sheds covering 6,006 *tsubo* in area were erected on the reclaimed ground between No. 1 mole and No. 2 mole and on No. 3 mole at a cost of Yen 180,000. Notwithstanding the serious congestion on the wharves, by the 9th year of Taisho exports and imports amounted to more than 2,000,000 tons, an amount greatly beyond all expectation.

1 *tsubo* = 1 *ken* sq. 1 *ken* = 2 yards.

The harbor improvements called for in the first section of the program were completed by the 10th year of Taisho. During this time there was a revision of the government organization. On the first of June, 2nd year of Taisho, the Kobe branch of the construction bureau of the finance department was abolished, and after that all the improvements were carried out under the supervision of Kobe branch of the construction section of the secretary's department of the finance minister.

2. Outline of Reclamation and Construction

Prior to the construction of the landing pier at Onohama, additional accommodations for storing imported goods were started at Kawasaki customs compound in 1906. Nine wooden sheds, covering an area of 3,330 *tsubo*, were built, as well as temporary office, numerous roads and wooden piers. Two years later, the eastern portion of No. 1 Hatoba or western customs was reclaimed and two wooden sheds were built which covered 525 *tsubo*.


Eastern Side of "A" Shed, Pier No. 11.

The modified project was to build four moles with intervals of 480-ft. and 540-ft. The mole to be built at the eastern extremity was one, whose eastern side was to act as a wave-breaker and its inner side as a quay. This mole will be 180-ft. in width and 1,290-ft. in length, while the others to have a nearly uniform length of 1,200-ft. and width of 336-ft. respectively. The reclaimed foreshore was to extend from the headline at Onohama on the east to the front of the former concession on the west, and it was necessary to fill in the sea which was about 20-ft. deep where the four moles were to project.

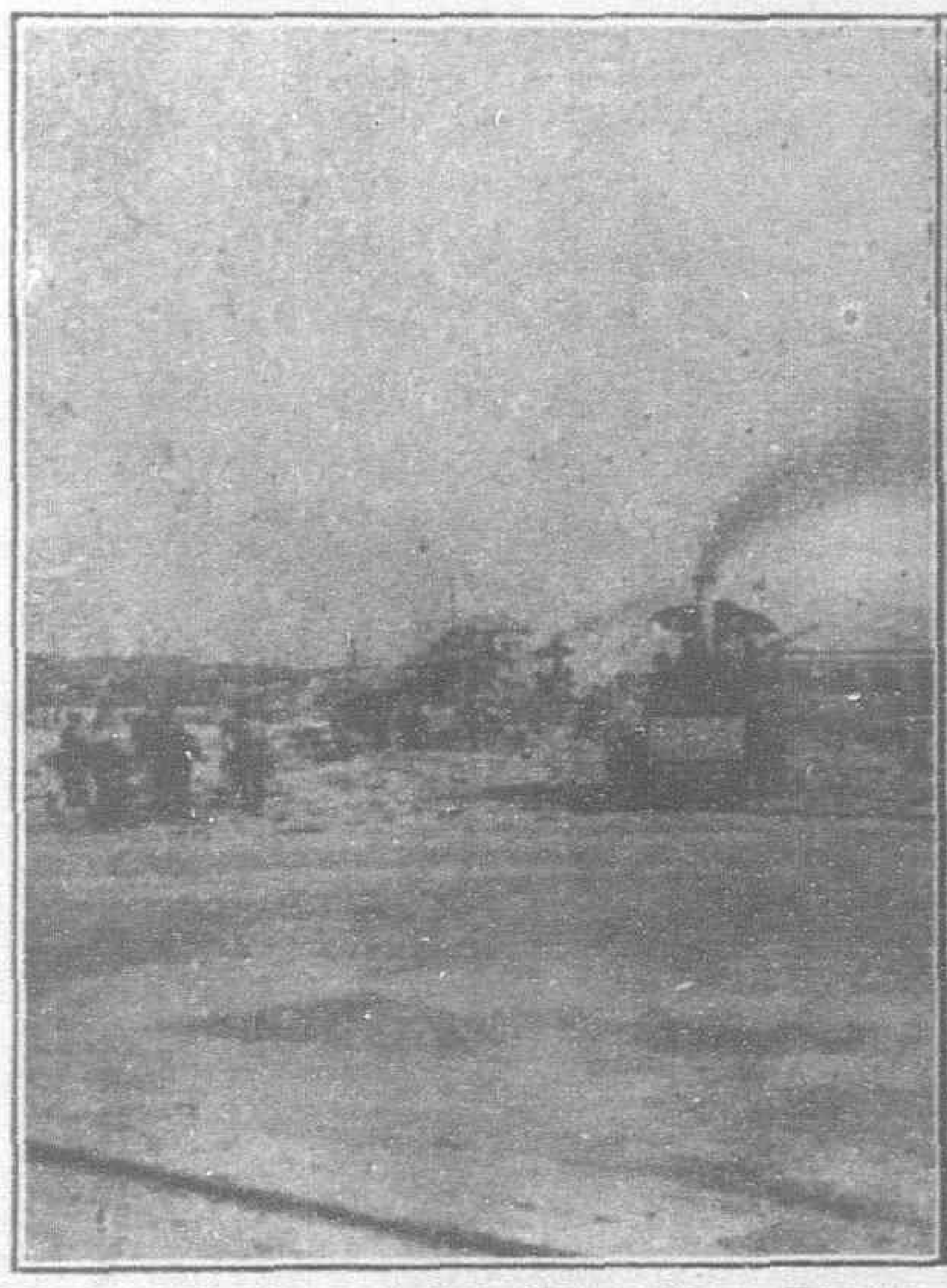
RECLAMATION.—The reclamation work was commenced in 1907 and completed in 1921 at an expense of approximately Yen 518,858. The total area of the reclaimed ground, including moles, covers about 65 acres and is 11-ft. above the mean low water spring tide. (Sand pump and Priestman dredgers constituted the main floating equipment for the work.)

DREDGING.—The total dredged area covers about 270 acres between and in front of the moles, depth of dredging varying from 30 to 36-ft. below M.L.W. level, according to the depth of the quay walls.

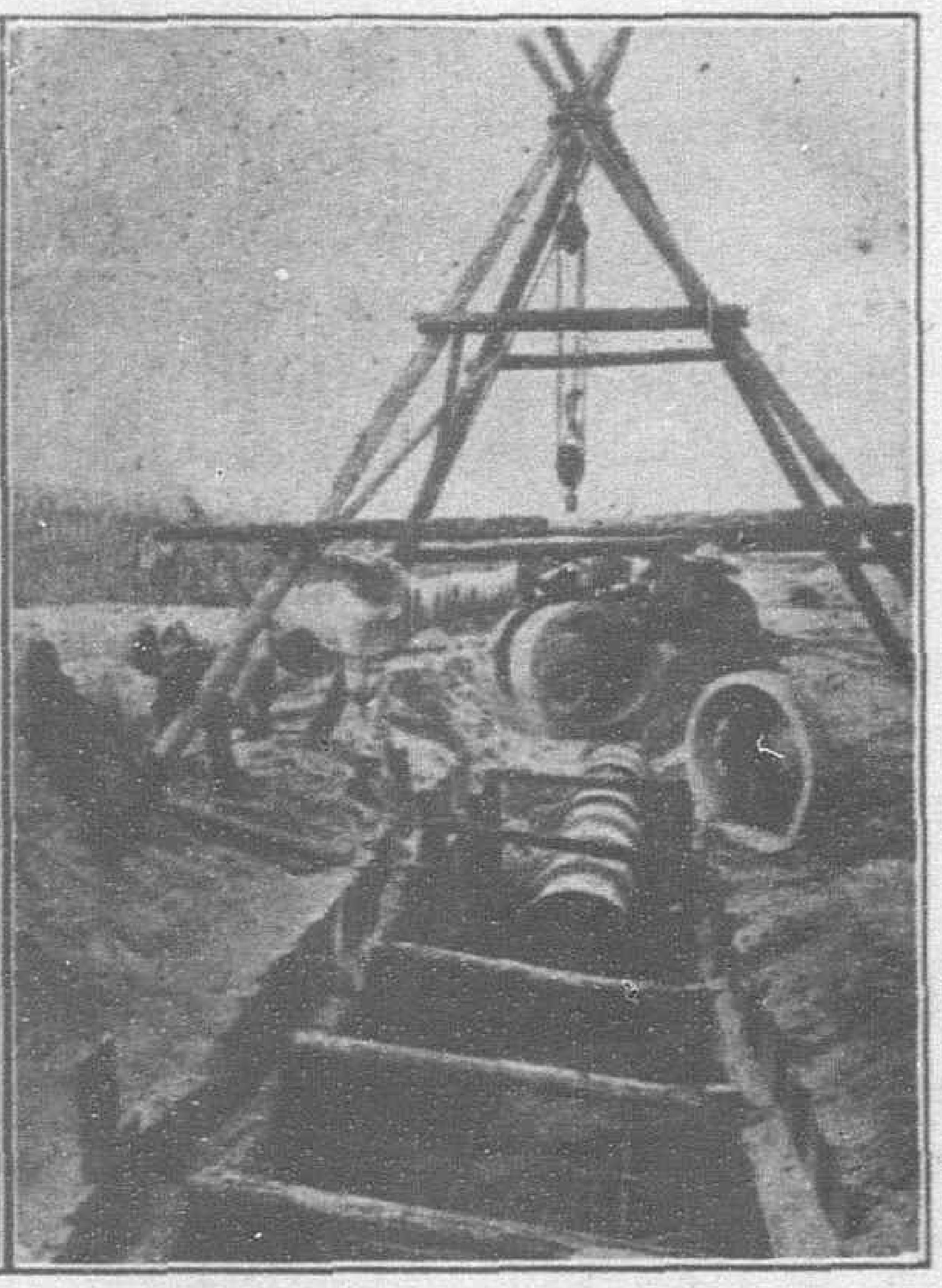
Depth of the space between Moles No. 1 and No. 2 Northern part. 33-ft. below L.W.L.
Depth of the space between Moles No. 1 and No. 2 Southern part. 36-ft. below L.W.L.
Depth of the space between Moles No. 2 and No. 3. 30-ft. below L.W.L.
Depth of the space between Moles No. 3 and No. 4. 30-ft. below L.W.L.
Depth of the western part of Mole No. 4 and general fairway. 30-ft. below L.W.L.
Depth of the fairway in front of No. 1 mole and No. 2 mole. 36-ft. below L.W.L.

Of the mud obtained by dredging, amounting to about 318,740 *tsubo*, sixty per cent. was utilized for the lower layer of the reclaimed ground, sand being deposited on the upper part.

Dredging was commenced in 1909 and completed in 1918 at an expense of about Yen 221,531. (Priestman type dredgers were chiefly used in this work).



Steam Rollers at Work on New Road



Laying the Main Sewer Pipes

LIGHTER WHARVES AND SEA WALLS.—No. 1 lighter wharf is 258 yds. in length and No. 2 and No. 3 wharves are 160 yds. and 180 yds. respectively, all of which were built upon concrete blocks piled on a rip-rap foundation. Numbers 1 and 2 wharves have upward slope, from a height of 7.5-ft. above L.W.L. up to the edge of the reclaimed ground in order to facilitate the handling of cargo by hand to and from lighters. The foreshore between Moles No. 2 and No. 3 was constructed with a steep slant in order that the charging and discharging of lighters could be done by cranes. Steel stairs, steam portable or hand fixed cranes together with numerous bits and rings were installed on all the wharves. These are available for mooring lighters and launches drawing about 9-ft. of water. The wharves were commenced in 1908 and completed in 1922, costing nearly Yen 263,635. The eastern side of No. 1 mole, which was built as a sea wall, is about 706 yds. long and was built of concrete blocks upon a rubble mound. This wall is 17-ft. above L.W. L. The work was started in 1907 and finished in 1914 at an expense of Yen 408,759.

Electric Traveling Crane unloading Cargo from Steamer

Electric Traveling Crane loading Cargo into Lighters

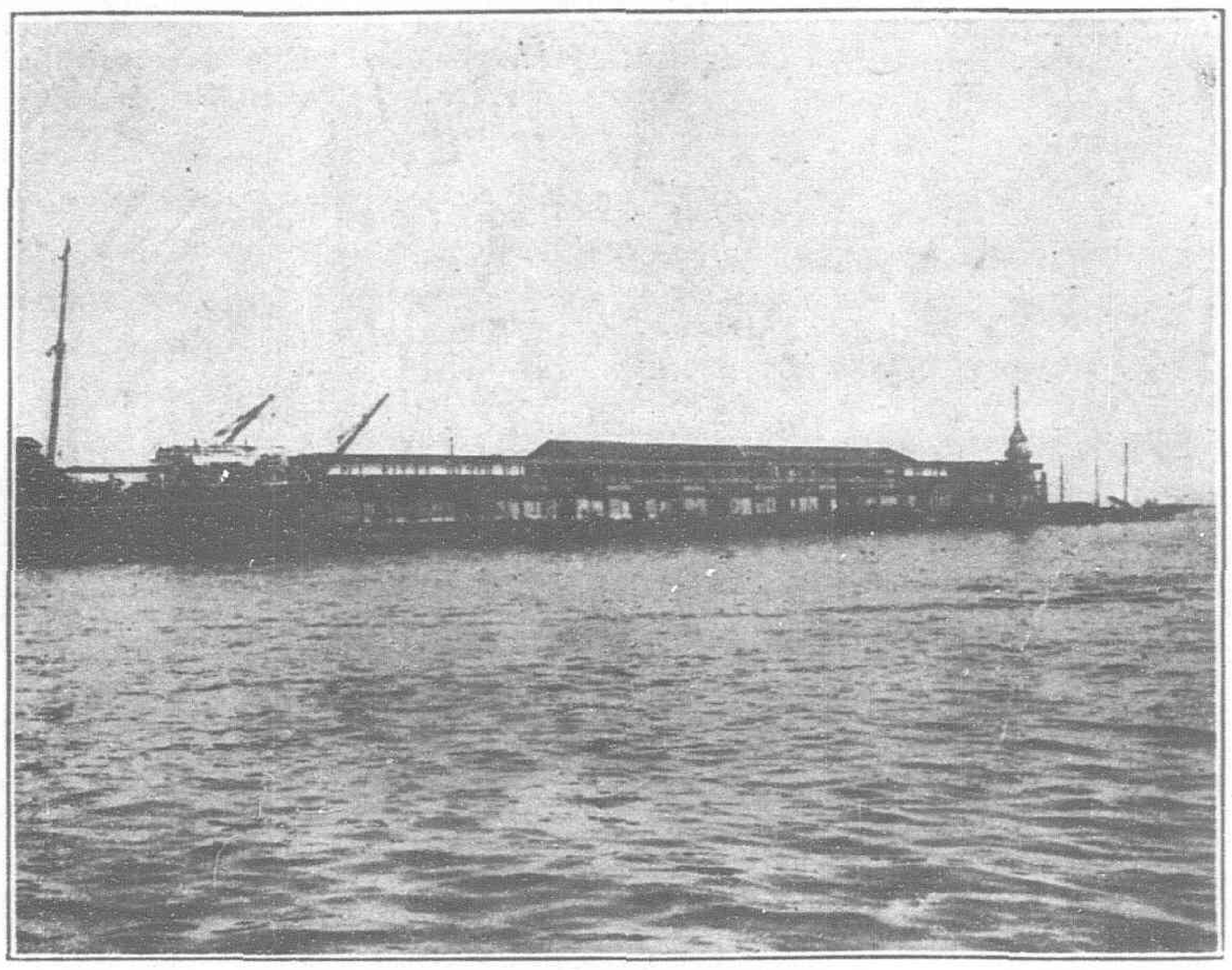
QUAY WALLS.—The total length of the quay walls is about 9,556-ft. with 8,172-ft. available as follows:

Quay	Height of Walls	Depth of Water below L.W.L. Level	Effective Length	Number of Ships Alongside
No. 1 mole southern part	47-ft.	36-ft.	780-t.	1
No. 2 mole east side southern part ..	47 ,,	36 ,,	780 ,,	1
No. 1 mole northern part	44 ,,	36 ,,	462 ,,	1
No. 2 mole east side northern part ..	44 ,,	33 ,,	390 ,,	1
No. 2 mole western side	44 ,,	33 ,,	1,134 ,,	3
No. 3 mole and No. 4 mole	41 ,,	30 ,,	4,626 ,,	12
Total ..	..	.. ..	8,172 ,,	19

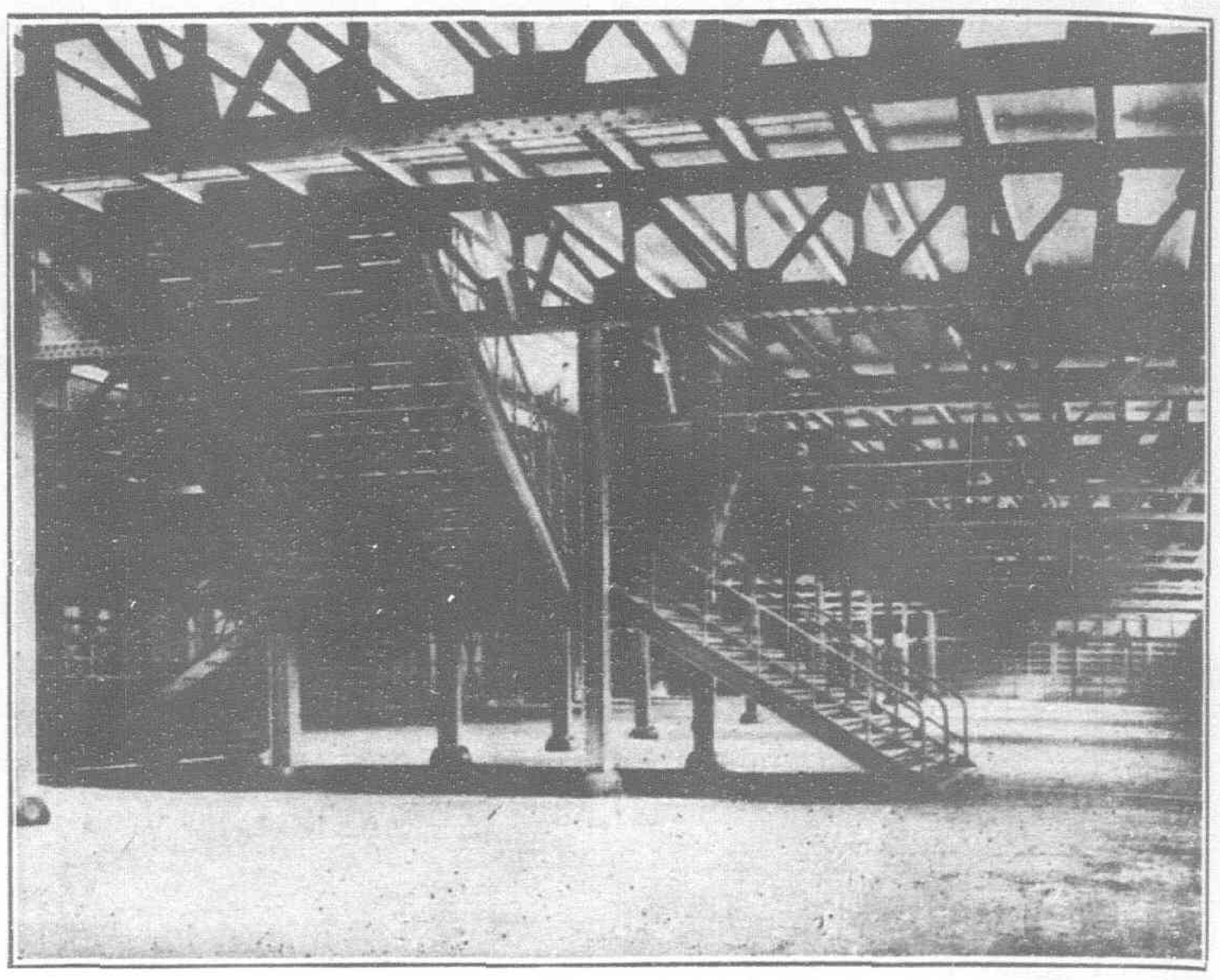
Presuming that 250 tons of cargo per foot were handled per annum, the total accommodations of the quays for loading and unloading cargo would be 2,100,000 tons per annum. Nineteen vessels can be moored alongside the quay walls at one time.

The sea bottom consists of soft mud to a depth of 6 or 7 ft. with layers of fine sand or hard clay underneath, but as a whole it lacks uniformity of strata, which fact caused serious inconveniences when putting down the foundations of the quay walls. After careful consideration, it was decided to construct a series of ferro-concrete caissons, the idea being to simplify the work of erection and to distribute the load over as broad as possible. Caissons were prepared beforehand on shore, towed to and deposited on their site, after which they were filled with concrete and sand. At the commencement of the operations the bottom was carefully tested to determine to what depth it would be necessary to bore to secure a firm bed upon which the caissons could be deposited. It was found necessary to dredge about ten feet to secure a bed which would be sufficiently firm to bear the weight of the caissons required.

In order to build the caissons on shore, comb-shaped wooden piers three blocks long were



"A" Shed from No. 2 Pier



Interior View of "A" Shed

constructed and the caissons were made upon them, after which they were floated by means of a depositing dock which was built at the Kawasaki Dockyard, Kobe, after the design of Messrs. Clark and Standfield of London, England. The dock measured 145-ft. in length, 137-ft. in width and 51-ft. in height. Eight pontoons were attached in a comb-like shape, leaving respectively a space larger than the width of the projections of the above-mentioned piers. To receive the caisson on the pier, the pontoons were pushed into this space. The pontoons were made of steel, oblong in shape, 17-ft. deep, 12-ft. wide and 70-ft. long. Inside the pontoons, were valves for taking in and letting out the sea water, so as to adjust the floating and submersion of the dock. A large outrigger 4-ft. deep, 67-ft. wide and 137-ft. long was fastened to one side of the wall by means of two steel columns and booms. This floated freely on the water to counterbalance the weight of the dock when it was loaded. Upon the side wall, engines and all other equipments were provided to serve as headquarters for the dock operations. According to the depth of the water, different size of caissons were used but most of them were for water of 30-ft. depth. These caissons were 35.5-ft. high and 22.85-ft. wide on the top, and for stability's sake 4-ft. wide and 4-ft. high around the bottom was provided. Both inside and outside walls of the caissons had an inward slant of 1,120, but the two ends were vertical, and from each end a small vertical wall projected to which the adjacent caisson was joined when under the sea. The thickness of the side walls and central longitudinal portions of the walls ranged from 1.5-ft. to 0.675-ft. while 9 partitions were 0.67-ft. at top and 1.22-ft. at the lower part. The interior of the caissons were divided into twenty small chambers. The caissons when in place appeared about 1.5-ft. above water at low tide and a steel water-tight cap specially built for the purpose was placed on top of the walls to cover all four chambers of each caisson. After pumping the water from the two of the front chambers, they were filled with concrete through a cylinder at the top of the cap, and sand was filled into two of the other chambers. Thus when 10 chambers were filled alternately with concrete and sand, the main body of the caisson was completed and formed a unit of the foundation of the quay walls. After the caissons were filled, the masonry and concrete work was built upon them forming the superstructure. Each caisson is 120 feet in length, and ten were required for each side of a mole. When in place, to avoid unequal settlement, a space about six inches was left between caissons, which was later filled in with concrete. The ferro-concrete caisson for 30-ft. depth of water weight about 2,000 tons while those in 33-ft. and 36-ft. of water weighed 2,300 tons. Caissons of the same size were used in 33-ft. and 36-ft. of water but concrete blocks four feet high were placed upon the tops of those in deeper water, to make up the difference. The total number of caissons used for the quay walls were 80, and the operations begun in 1911 was finished in 1918, at a total expenditure of Yen 2,825,400. This expenditure includes mooring posts, bollards, steel rings and staris, for all the quay walls.

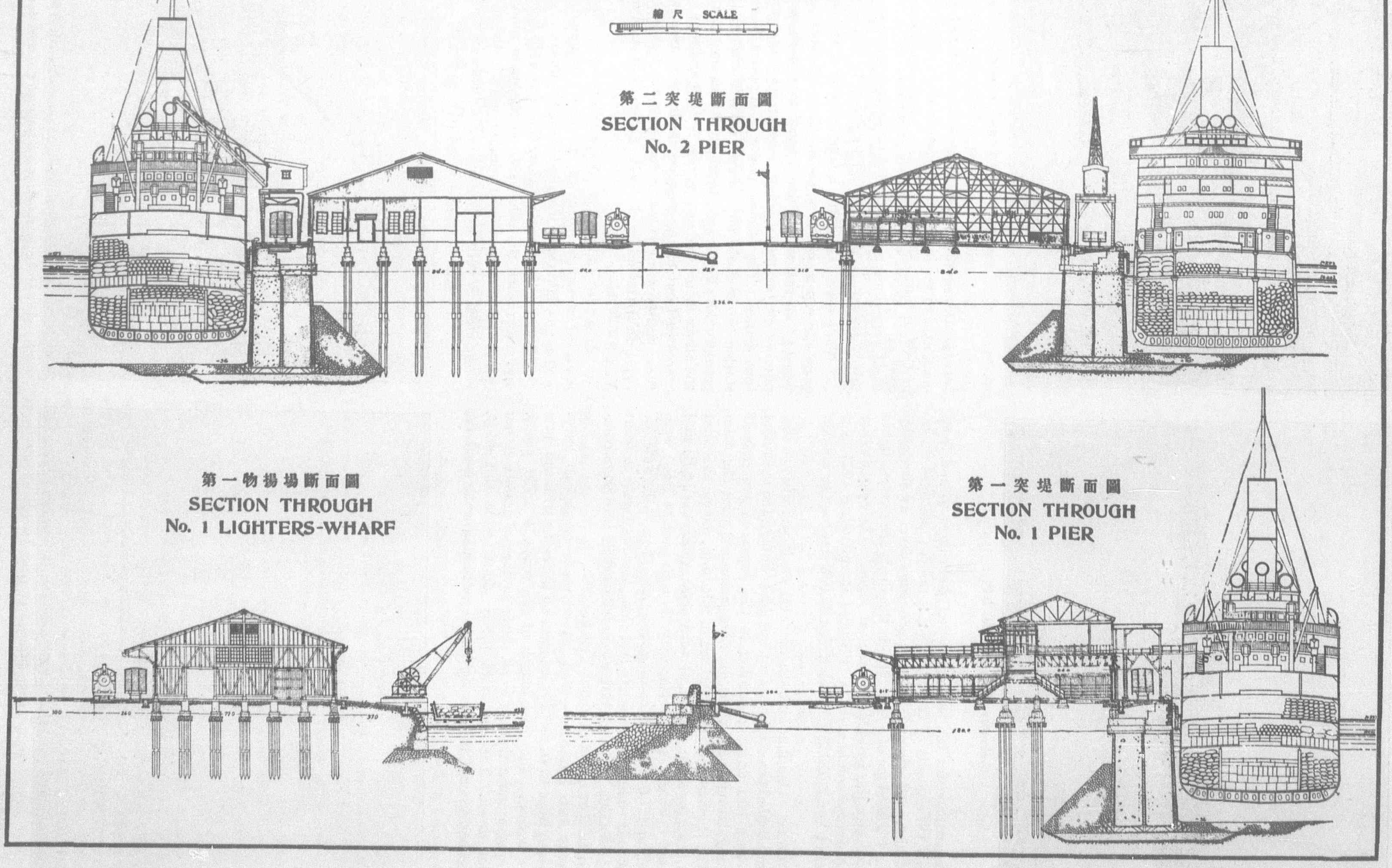
SHEDS.—Sheds were constructed of steel and of wood, totalling in all eighteen. The steel sheds are on the moles, and are used by ocean-going steamers, while the two wooden sheds are for lighters. The steel sheds cover an area of 539,451 sq. ft. each shed measuring from 288 to 540-ft. with a uniform span of 84-ft. The two wooden sheds were built at No. 1 lighter wharf, both with a span of 72-ft. and cover an area of 38,316 sq. ft. The sheds on the moles were built paralled to the quay wall and 23-ft. from the edge. The wooden sheds were built at a distance of 32-ft. from and parallel with the lighter wharves. The particulars of the sheds are follows:

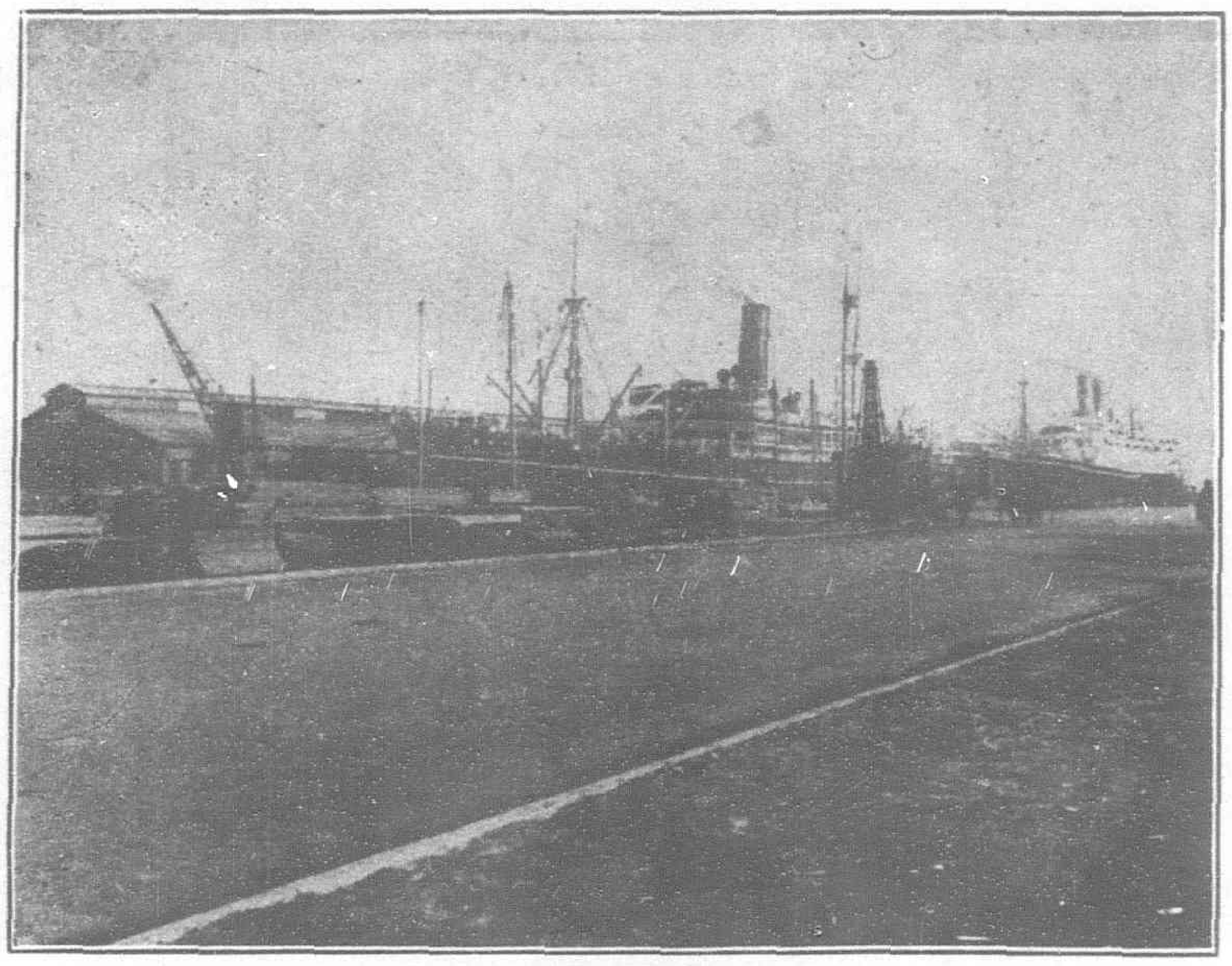
Shed No.		Length ft.	Span ft.	Area sq. ft.	Places where Built
1	Wooden	336	72	24,192	No. 1 lighters wharf.
2	,,	192	72	13,824	do.
A	Steel	540	84	60,147	No. 1 mole.
B	,,	468	,,	39,312	do.
C	,,	504	,,	42,336	East side of No. 2 mole.
D	,,	504	,,	42,336	do.
E	,,	360	,,	30,240	West side of No. 2 mole.
F	,,	288	,,	24,192	do.
G	,,	360	,,	30,240	East side of No. 3 mole.
H	,,	288	,,	24,192	do.
I	,,	504	,,	42,336	West side of No. 3 mole.
J	,,	432	,,	36,288	do.
K	,,	360	,,	40,824	East side of No. 4 mole.
L	,,	288	,,	24,192	do.
M	,,	288	,,	24,192	do.
N	,,	360	,,	30,240	West side of No. 4 mole.
O	,,	288	,,	24,192	do.
P	,,	288	,,	24,192	do.
		16 steel	sheds	539,451	
		2 wooden	sheds	38,016	
		Total 18	shed.	577,467	

N.B.—The area 60,147 sq. ft. of A shed includes 14,787 sq. ft. of the second story.
The area 40,824 sq. ft. of K shed includes 10,404 sq. ft. of second story.

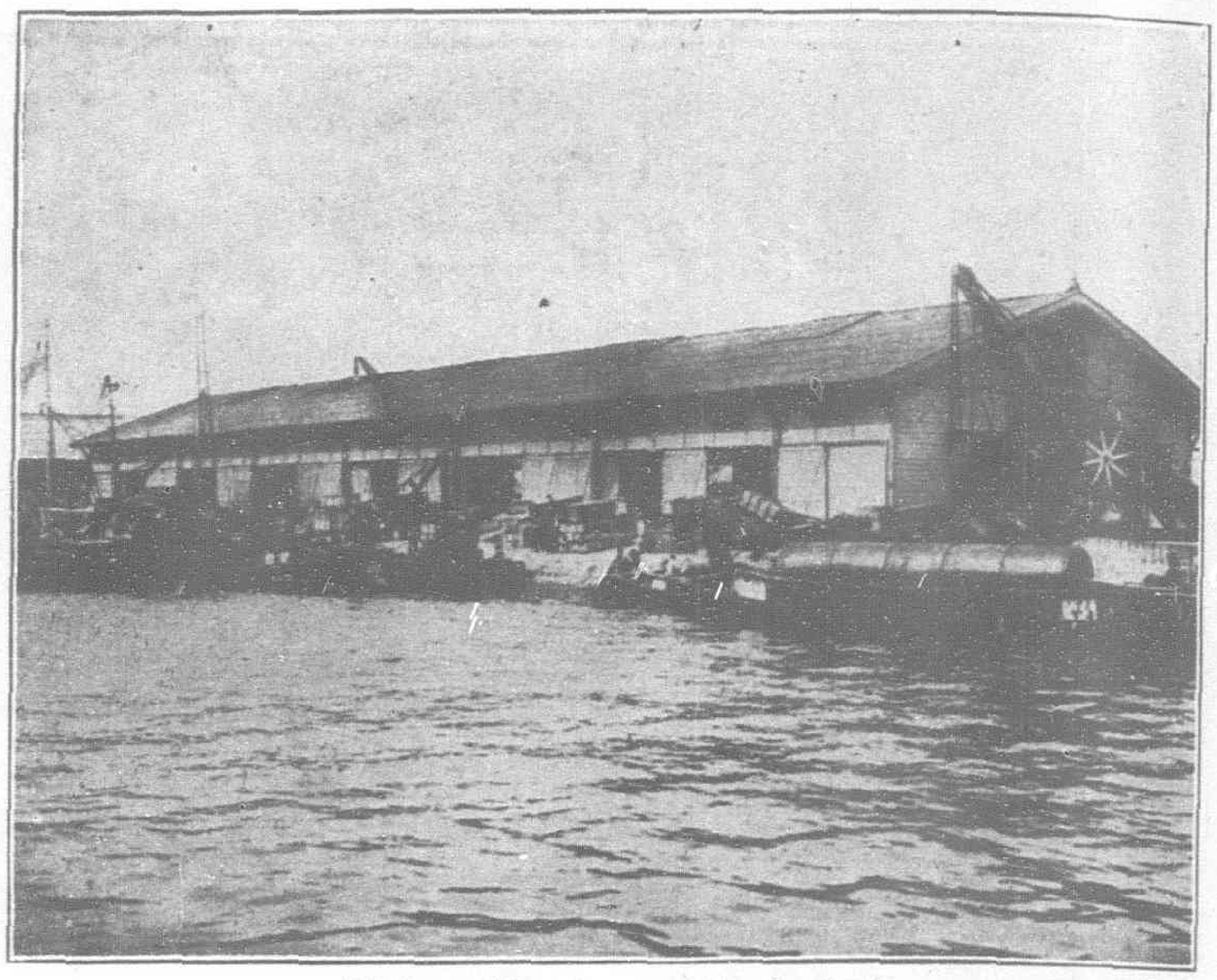
The floors of all the steel sheds are of asphalt and concrete, and those of the wooden sheds of granolithic concrete. The floors of all sheds are the same level as the quay wall, with the exception of the two steel sheds A. and K. These sheds are of special two

SECTIONAL VIEW OF PIERS AND LIGHTERS-WHARF





Steamers alongside No. 1 Pier



Lighter Wharf near " Kyobashi "

story construction for the convenience of passengers to and from steamers. On one side of these sheds is a railway platform about two feet high while the other side is the same level as the quay making a slight slope of 1/42. Inside the sheds are electric lights which facilitate the handling of cargo at night. The construction of the sheds was commenced in 1910 and completed in 1921 at a total cost of Yen 2,616,210 of which Yen 65,958 was for the wooden sheds.

RAILWAY.—One line between the steel sheds and quay walls, 2 or 3 lines behind the sheds, and several lines through the reclaimed ground were laid down, according to the Japanese government railway regulations. All these lines are connected with the main line at the Onohama station and are of 3-ft. 6-in. gauge, the total mileage being over 10 miles. 21 turntables (diameter 15-ft. and 14-ft.) and 6 weight-bridges (capacity 30 tons and 24 tons) were provided, and 1.6 miles of broad-gauge rails 13-ft. 6-in. wide for the electric traveling cranes were laid along the quay walls in front of the steel sheds. The operations commenced in 1910 were completed in 1922 at a cost of about Yen 474,221.

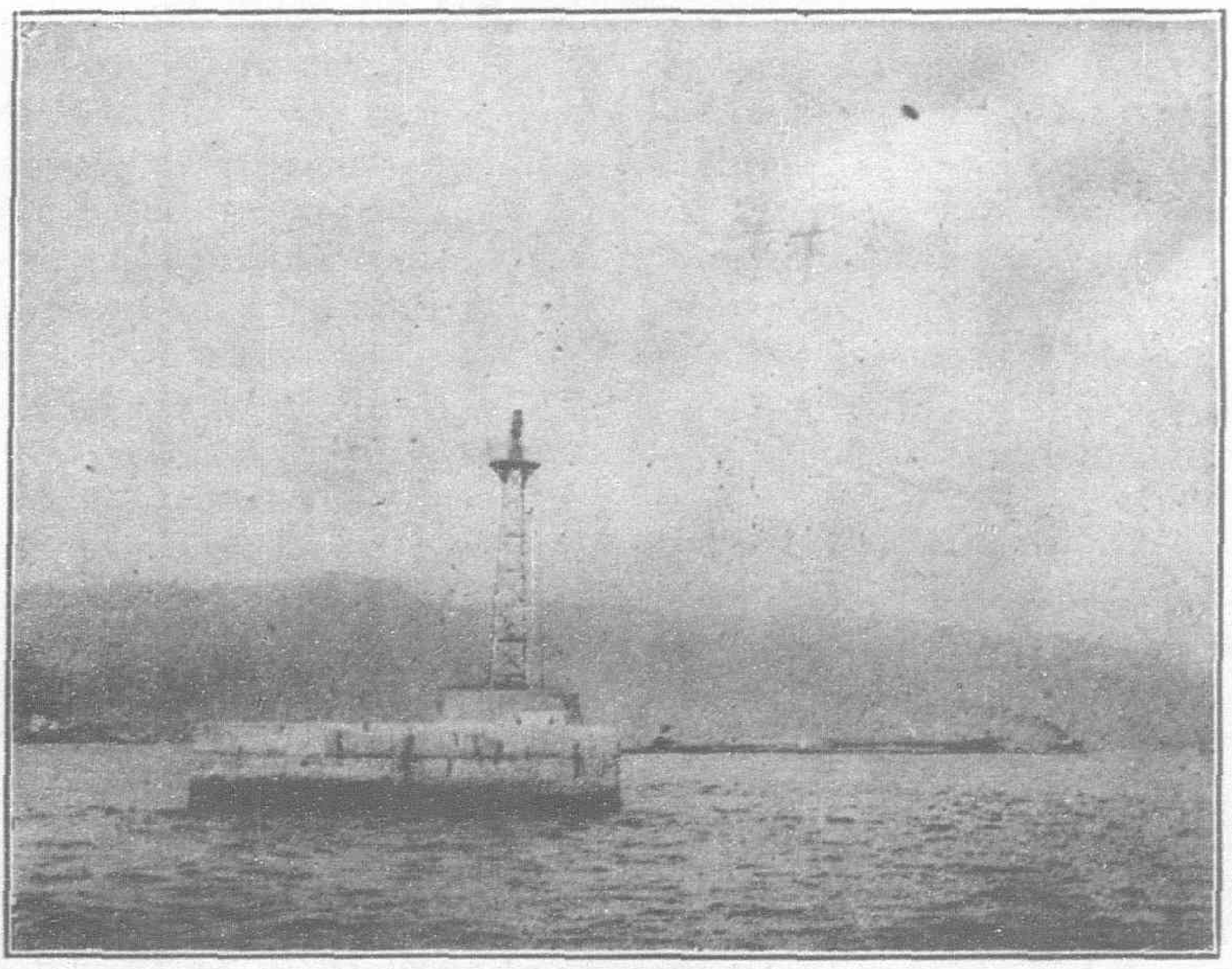
ROADS AND BRIDGES.—Well paved roads of asphalt varying in width from 42-ft. to 72-ft. connect all the moles with the main business section. The total length of the roads is 4,720 yards. On the quays and entrances to all sheds pavings of granite stones were put down. The Kyobashi bridge 66-ft. wide and 66-ft. long, and high enough to allow lighters to pass underneath was built between the north-western part of the reclaimed ground and the main road of the former foreign concession. The operations begun in 1908 and finished in 1922 at a total expenditure of about Yen 837,788.

CRANES.—Each quay has electrically operated traveling cranes of various capacities ranging from 1½ tons to 5 tons.

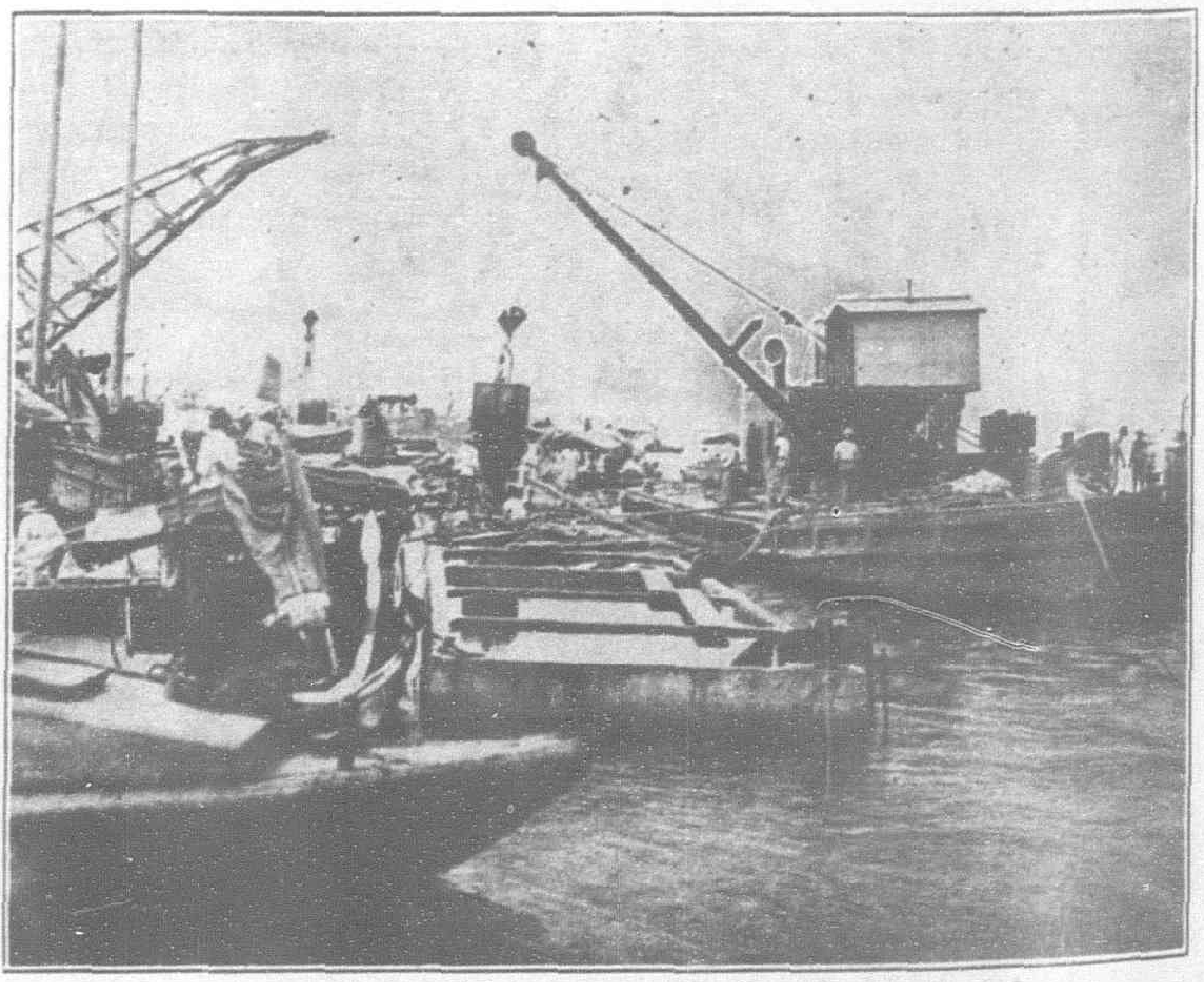
They travel along the quays in front of the sheds and handle cargo directly to and from the hatches. On each side of the quays, two 1½ tons cranes and one 5 tons crane were installed, the total number on the moles being fourteen 1½ tons cranes and seven 5 tons cranes. The electric power is supplied from the generating station of the Kobe city office and is distributed through underground cables by the sub-station in the customs compound. Besides the above-mentioned cranes, one 30 tons and four 5 tons fixed hand cranes in front of the wooden sheds were installed. The first of these cranes was erected in 1908 and the last in 1922. The total expenditure including the cost of the sub-station office amounts to Yen 650,306.

ELECTRIC LIGHT AND WATER SUPPLY.—Electric lights were installed along the roads of the new compound, and electric as well as gas lights were installed along the quays.

Water mains were laid along the quay walls for supplying vessels and underneath the side-walks of the main roads of the customs compound numerous fire hydrants were installed. The work was commenced in 1910 and completed in 1922 at a cost of Yen 182,700.



View of Eastern Breakwater



Eastern Breakwater under Construction

Miscellaneous.—Two powerful tugboats costing Yen 214,750 (length 100 and 95-ft. width 24-ft. and 23-ft. and depth 12-ft. and 11.5-ft. respectively) were provided for assisting vessels alongside the quays. Two iron foot bridges to be used as passenger gang ways were added as well as a signal tower on the No. 1 mole for displaying berthing signals to vessels entering the port. The total cost of all the miscellaneous accommodations was approximately Yen 142,536.

3. Utilization of the New Accommodations of the Chief Officials

Since October 1913, the completed portions of the new harbor accommodations have been used by the public, and the construction bureau has exerted their best efforts to insure their full utilization. In 1920, the total amount of imports and exports, including intermediate cargo, reached 5,544,000 tons, and 47 per cent. of this amount or 2,066,000 tons passed over the moles, taking advantage thereby of the new facilities. As the original object of the improvements was to provide accommodations and facilities for handling 2,100,000 tons of cargo per annum, it will be seen from the above that even before their completion, this objective amount was nearly realized. From this it will be clearly understood how important the improvement works of Kobe harbor were to foreign trade.

Since January, 1917, the railway facilities connecting the main line system at Onohama station with the custom compound have been in use and in 1920 the total amount of cargo, loaded or unloaded, reached 179,000 tons on 68,000 trucks.

All these works are under the jurisdiction of the construction section of the department of finance, and were carried out by the Kobe branch of the section.

CHIEF OFFICIALS—HEAD OFFICE (TOKYO)

Director :	K. Yabashi, D.SC.
Business-Controller :	F. Kimoto.
Architect :	T. Chichibu.
Civil Engineer :	H. Inoue.

BRANCH (KOBE)

Chief :	O. Matsumoto.
Chief Engineer :	K. Morigaki, D.SC.
Architect :	J. Ikeda.
Civil Engineer :	Y. Asai.

4. Second Section: Outline of the Improvements of Kobe Harbor Under Construction

The completed parts of the new accommodations of Kobe customs, as already mentioned, have been utilized since October 1913. The east breakwater, 1,264 yds. long, and the south breakwater, 1,000 yds. long, were commenced in 1910 and 1917 respectively to protect the new harbor accommodation. Although the accommodations of the harbor have continually been increased, the great European war had the effect of increasing the domestic and foreign trade of the port to such an extent, that further improvements and extensions of the harbor were necessary. The city of Kobe saw the necessity of expediting these additions and volunteered to bear part of the expenditure of the undertaking. The government thereupon transferred the control of the construction of the above-mentioned breakwaters to the home department in April 1919, and decided to commence extending the equipments of the port for handling domestic and foreign trade. The estimated cost of these extensions was Yen 27,100,000 and called for completion of the program by 1929.

The program includes the improvement at Hyogo of facilities for domestic trade, and an extension of facilities on the seafront of Hamabe-dori for foreign trade; an extension of the facilities at Kaigan-dori, for both foreign and domestic trade; the reclamation of the seashore of Hyogo and Kobe; the establishment of more landing and moorings, places for lighters; and an extension of the breakwaters for the purpose of securing a larger protected anchorage.

I

The improvements on the reclaimed ground, for foreign trade, are to be carried out by the finance department, while those for domestic trade, by the city of Kobe. The following is the general plan of the scheme to be carried out by the home department:—

RECLAMATION

Equipments for	Location.	Area.			Remarks.
Foreign trade		90,747	*tsubo*	(about)	Seafront of bund and No. 2 wharf
	Kaigan-Dori	11,147	,,	,,	
	Hamabe Dori	78,600	,,	,,	Seafront of Hamabe-dori
Home trade		91,628	,,	,,	
	Hyogo	81,600	,,	,,	
	Kaigan-Dori	10,028	,,	,,	Seafront of Hyogo
Total		182,375	,,	,,	Seafront of No. 3 wharf

QUAYS

Equipments for	Location.	Depth below Low water ft.	Length. Ken.	Accommodations.
Foreign trade			1,430.7	15 vessels of large and small size.
	Hamabe-Dori	33	1,430.7	
Home trade			1,670.0	22 vessels of large and small size.
	Hyogo	30	330.0	
	,,	28	170.0	
	,,	24	600.0	
	,,	18	120.0	
	Kaigan-Dori	28	290.0	
	,,	18	160.0	
Total			3,100.7	

LANDING PLACES

Equipments for	Location.	Depth below Low water ft.	Length. Ken.
Foreign trade			873.0 (about)
	Kaigan-Dori	12	188.0
	,,	9	297.0
	Hamabe-Dori	12	278.0
	,,	9	110.0
Home trade			935.0
			935.0 (about)
	Hyogo	12	285.0
	,,	9	650.0
Total			1,803.0

BREAKWATER

Classification.	Location.	Length. Ken.	Remarks.
For morings for foreign trade	Kaigan-Dori	100.0	For mooring of lighters
Total		100.0	
Kobe harbor	East breakwater (the work already commenced)	632.0	Completed except parapet wall
,, ,,	No. 1 East breakwater	600.0 (about)	Extension of east breakwater already started
,, ,,	No. 2 East breakwater	950.0	
,, ,,	South breakwater (the work already commenced)	500.0	Under construction
Total		2,682.0	

II

The following is the general plan of the improvements for foreign trade to be carried out by the Kobe branch of the construction section of the finance department. The work commenced in 1921 to be completed within twelve years.

Sheds.—There will be eight sheds erected on the moles which will be of two classes, i.e., ferro-concrete or steel according to the conditions of the ground upon which they will be built. Two of the sheds will be two storied with accommodations for passengers, while the others will be one storied structures built so that they can easily be increased to two storied if desired. The eight sheds along the lighter wharves to be of wooden.

The particulars of the sheds are as follows :

Sheds No.		Length.	Span.	
1	Ferro-concrete or steel	666 ft.	120 ft.	159,840 sq. ft.
2	,,	594 ,,	120 ,,	71,280 ,, ,,
3	,,	540 ,,	90 ,,	48,600 ,, ,,
4	,,	540 ,,	90 ,,	48,600 ,, ,,
5	,,	486 ,,	90 ,,	43,740 ,, ,,
6	,,	360 ,,	90 ,,	32,400 ,, ,,
7	,,	486 ,,	96 ,,	93,312 ,, ,,
8	,,	360 ,,	96 ,,	34,560 ,, ,,
9	Wooden	288 ,,	96 ,,	27,648 ,, ,,
10	,,	228 ,,	42 ,,	9,576 ,, ,,
11	,,	228 ,,	42 ,,	9,576 ,, ,,
12	,,	234 ,,	84 ,,	19,656 ,, ,,
13	,,	198 ,,	84 ,,	16,632 ,, ,,
14	,,	180 ,,	60 ,,	10,800 ,, ,,
15	,,	600 ,,	60 ,,	36,000 ,, ,,
16	,,	600 ,,	60 ,,	36,000 ,, ,,
	Ferro-concrete or steel shed.	8 ft.		532,332 sq. ft.
	Wooden sheds.	8 ,,		165,888 ,, ,,
			Total	698,220 ,, ,,

N.B.—The area 159,140 sq. ft. of No. 1 shed includes 79,920 sq. ft. second story.

The area 93,312 sq. ft. of No. 7 shed includes 46,656 sq. ft. second story.

THE MAIN BUILDING OF CUSTOM-HOUSE AND BRANCH OFFICE.—A three-storied building with a ground area of about 21,600 sq. ft. will be erected in the customs compound to be occupied by the Kobe custom-house and a two-storied office with a ground area of about 5,238 sq. ft. at the American hatoba as a customs inspection office. In addition there will be constructed, baggage examination offices, electric substation, passenger gang ways and other essential improvements.

ROAD AND RAILWAY.—There will be constructed three miles of pitch and asphalt roads, 12 to 30 feet wide, having granite pavements. The railway lines on each mole will connect with the trunk line at Onohama station. Many turntables, and scales for wagons will be installed. Wide gauge rails for the electric traveling cranes will be laid along the quays. The total length of rails, both for wagons and cranes, will be about 6.2 miles.

CRANES.—Eight sets of 1½ tons traveling electric cranes and four sets of five tons traveling electric cranes will be erected on the quays.

ELECTRIC LIGHT, WATER SUPPLY, ETC.—Electric lights will be placed along the roads of the new compound and inside the sheds. Water mains will be laid along the quay walls and hydrants will be installed throughout the compound for supplying vessels and for emergencies. Two powerful tug-boats for towing vessels alongside the quays will be provided.

The Expenditure

The expenditure for the works under the jurisdiction of the home department is estimated at Yen 31,770,000 of which Yen 11,000,000 is for foreign trade equipment, Yen 9,300,000 for domestic trade equipment, Yen 6,800,000 for the constructions of the breakwaters and Yen 4,670,000 for the construction of the breakwaters already started.

The total expenditure for the works under the jurisdiction of the finance department is estimated at Yen 9,500,000. Thus the total expenditure is Yen 41,270,000 of which Yen 16,450 will be borne by the city of Kobe.

Cut in Japan's Railway Estimates

THE estimate for the special accounts of the imperial railway department for 1923-4 is now being compiled and it is believed that the department is facing difficulties in the work of compilation, says the *Osaka Mainichi*. It is understood that the department will have to cut the plans of new railway lines by 20 per cent.

The revenues of the department in April, May and June, from the passenger and freight services, showed some increase, but the rate of increase has been decreasing month by month. It is believed that it will be difficult to estimate the total revenues of the department over Yen 400,000,000, which was the estimate for the working budget for the present fiscal year. Even if a cut may be realized in expenditure by administrative readjustment, the net profits for the present fiscal year will not go beyond Yen 103,000,000. Even should the surplus of this year be carried forward to next year, the amount would be very small.

Moreover, the finance office has requested that the policy of 25 per cent. "*tembiki shugi*" (stoppage at source) be carried out in the bond issue policy of Yen 80,000,000, of the railway department, i.e., to cut it down to Yen 60,000,000. If that cut be realized, the department will find it impossible to carry out even the already decided plans.

Claim of Department

The claim of the department, already approved, for the 1923-4 instalment, amount to Yen 195,950,000, including the estimate of 20 per cent. for the rise of prices. This amount can barely be met even if the bond policy of Yen 80,000,000 were altogether approved of by the finance office.

The department, however, is obliged to claim appropriations for a number of new railway lines, in deference to the railway construction law, passed by the 45th session of the diet. If nothing be done in that direction, the law will become a dead letter, thereby endorsing the views expressed in the house of peers, during the last session of the diet. Count Oki, the minister of railways, however, has declared in favor of carrying out the plans of the railway construction law, whereas Mr. Ishimaru, vice-minister, who has remained in office since the ministry, is responsible for the law.

As for the Seiyukai party, the question is one of the dignity and honor of the party, since that party had supported the construction law in the past.

Question of Electrification

There is further the question of electrification of railways, an appropriation for which needs to be asked for 1923-4. This item will call for Yen 60,000,000 and odd figures of expenditure for construction of railways, cars, generating and transforming stations. The expenditure for electric cars will amount to Yen 35,000,000 out of that total. Of the remaining Yen 30,000,000, there is an amount of about Yen 7,000,000 for the expenditure for electrifying the railway between Tokyo and Numazu, which had already been voted for before, leaving Yen 23,000,000 to be obtained anew.

If the work of electrification is to be completed in five years, the new annual instalment will amount to about Yen 4,000,000 or more.

As to the new railway lines to be laid down, at an average of 40 miles of length per line, Yen 200,000 of expenditure per mile, a total of Yen 8,000,000 will be needed for completing one railway line. If ten lines are to be built, Yen 80,000,000 will be needed.

The Fuji-Minobu Railway Co.

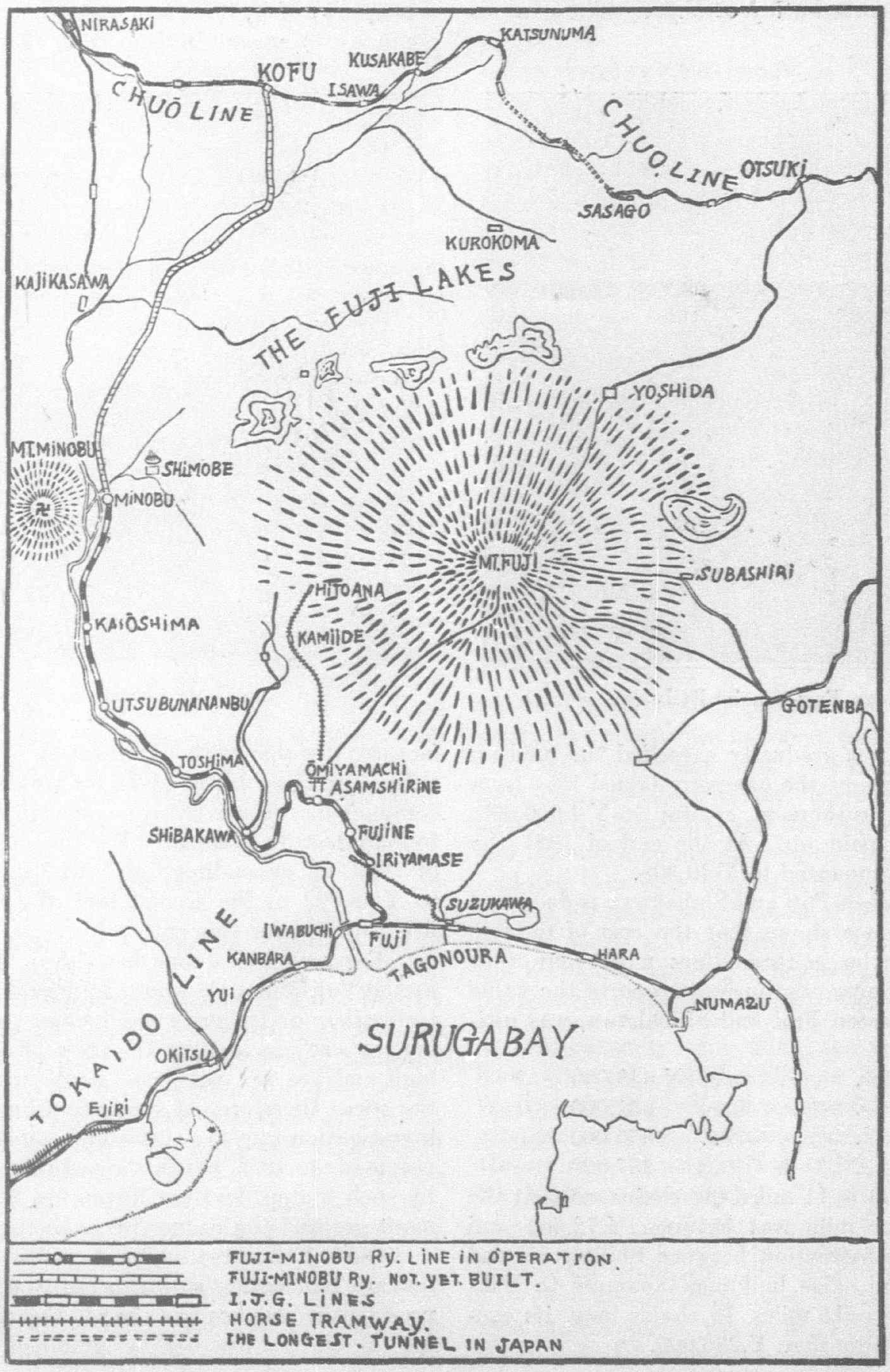
Plans for its Electrification

THE Fuji-Minobu Railway Co., Ltd., was established in 1912, purchasing the line and equipment of the Fuji Tetsudo K. K., for Y.106,400. The new company at once began to improve the line between Fuji station on the Tokaido line of the imperial government railways, and Omita, the town of a distance of 6 miles and 32 chains. The gauge was changed to Japanese standard guage, 3 feet 6 inches, and the line opened to business on July, 20, 1913. At the same time a horse tramway was built between Suzukawa and Iriyamase, 69 chains.

In the first half of 1914, the company began construction of the line between Omiya and Minobu, under a guaranty from the Kounji temple on Minobu mountain, the chief temple of the Nichiren sect of Buddhism of an annual passenger traffic of 150,000 round trips for five years and agreed to pay any deficiencies in income, if the through passenger traffic failed to reach that figure.

The section between Omiya and Shibakawa, 5 miles, 48 chains, was opened March 1, 1915. North of Shibakawa, the country is mountainous and very rocky and it took three years to complete the section between Omiya and Tashima, 4 miles, 32 chains, which was opened to business August 10, 1918. The remaining section between Omiya and Minobu were not completed till 1920, the total mileage being 26 miles, 79 chains.

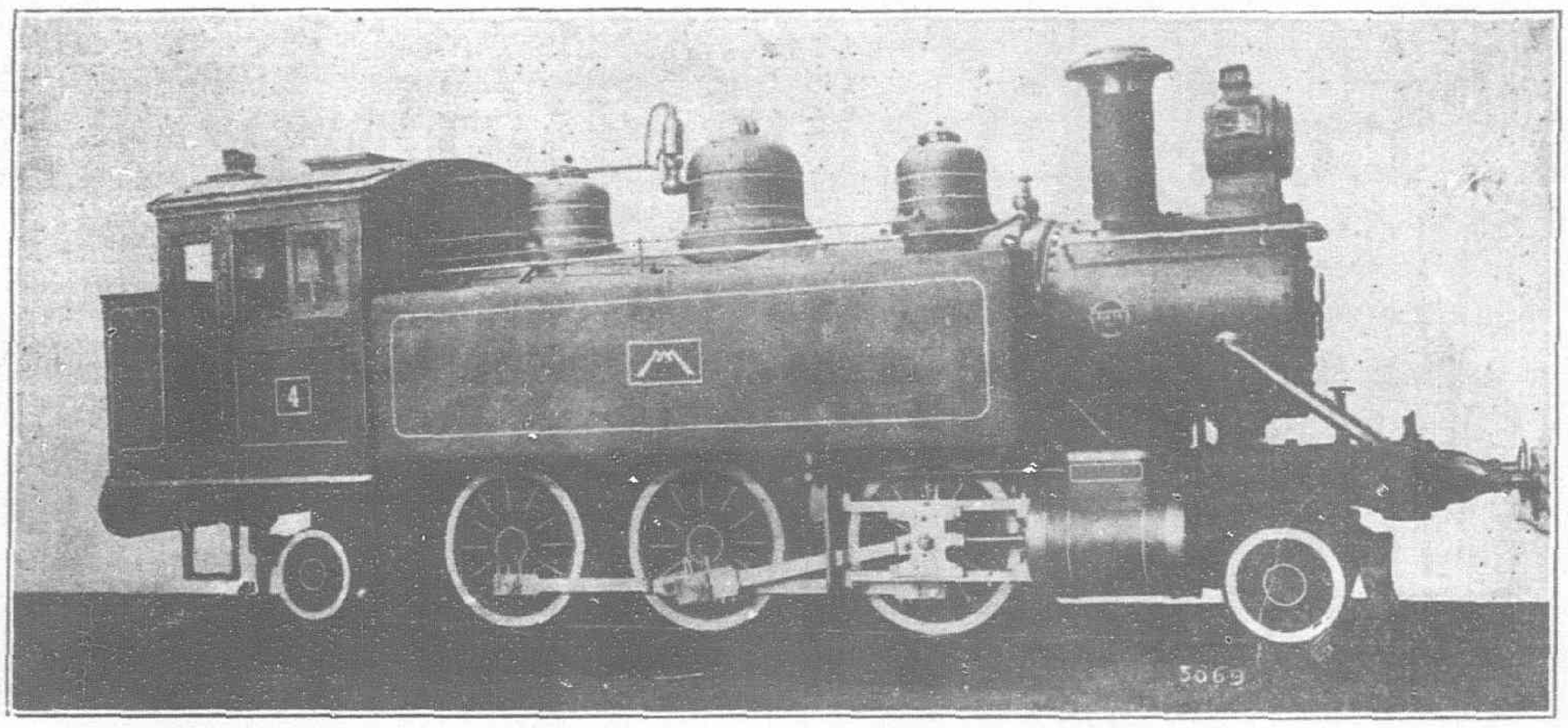
Immediately upon the completion of the line to Minobu there was a rush to visit the Kounji shrine. During the first half of 1920 the number of passengers carried reached the highest figure in the history of the company, but owing to the financial depression there has since been a falling off in traffic. In 1921, the seven hundredth anniversary of the birth of Nichiren was celebrated at Minobu, but the occasion failed to attract a larger number of passengers than at the opening of the line. The number of through passengers increased and revenues were augmented by raising the passenger fares in April, 1920. The number of holiday-makers, however, is increasing especially climbers of Mt. Fuji. The younger generation is also studying the Nichiren doctrines, now popular because of the intensity of the nationalism preached by that sage.



The scenic beauty of the line attracts many passengers and a through traffic arrangement with the government's line at Fuji station, has materially augmented the number of passengers carried. Increase of business from year to year was largely the result of lengthening the line, but some of the company's prosperity was due to the general prosperity of the country. Consequently when the panic of 1920 wrought havoc in all classes of industry, the Fuji-Minobu Railway, also felt its effects in a decreased passenger and freight traffic.

As a general rule construction costs of mountain railways are extremely high and the Fuji-Minobu line is no exception to this rule. Furthermore, excursion lines have little, if any, freight traffic to decrease costs of operation per mile. The Fuji-Minobu line is primarily an excursion line, although it is doing a fine bit of pioneer work in opening up a new district for settlement and agricultural development through easy means of transportation. Between Fuji and Shibakawa costs of construction were quite normal, but between Shibakawa and Minobu, north of Shibakawa, the line runs through the mountains and costs of construction were extremely high. The company, therefore, charges a very high passenger fare.

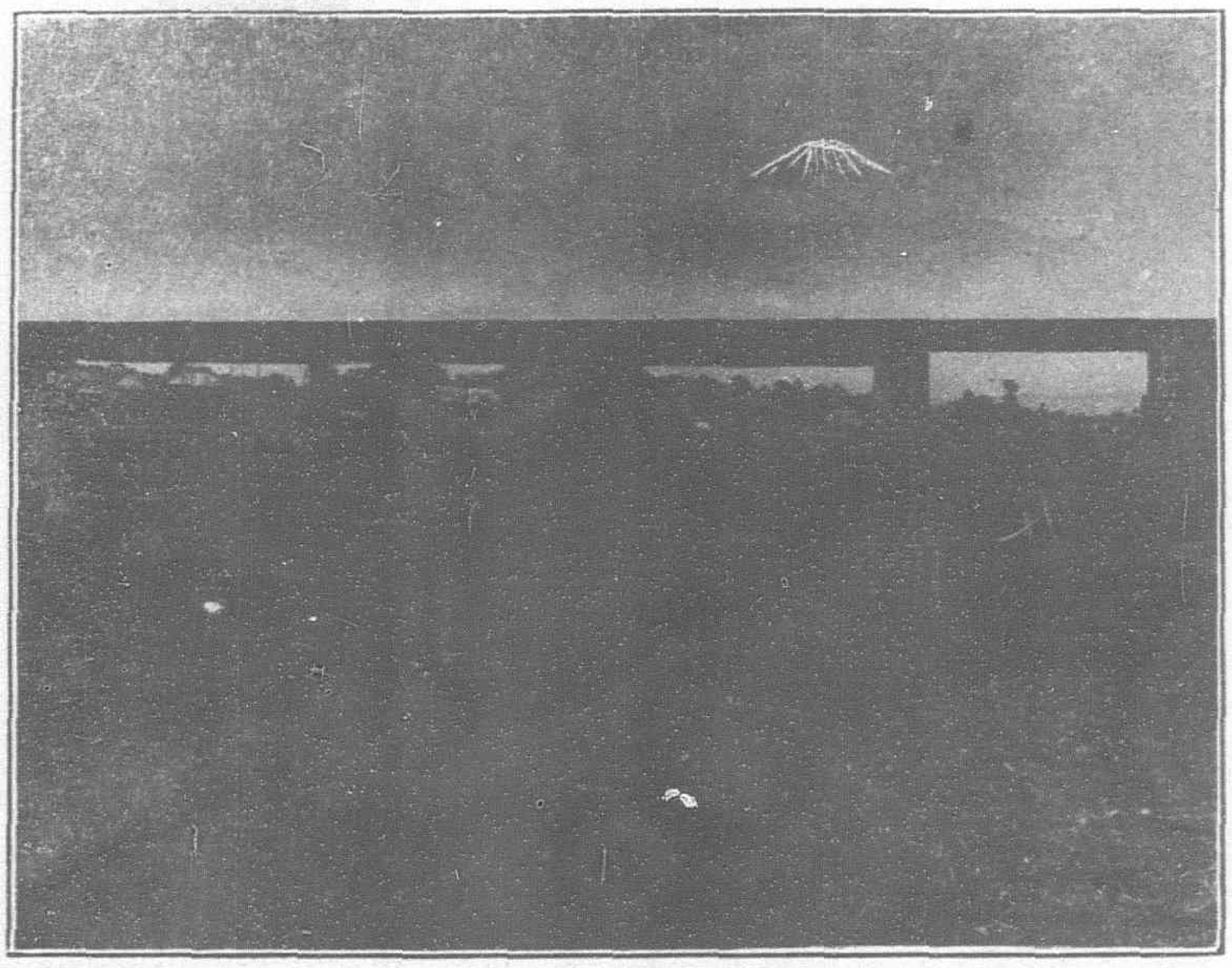
Just before the line north of Shibakawa was opened to business, the imperial government railways raised all passenger fares on the plea that the cost of commodities had risen to such an extent that an increase in passenger fares was quite in order. Permission to raise rates was also extended to private railways, and the Fuji-Minobu line took advantage of this privilege, and raised the fare per mile to 5.5 sen, third class, for the Fuji Omiya section, while from Omiya to Minobu it is 1 sen higher per mile. Second class is twice the third class fare. In figuring freight rates the company was permitted on April 18, 1921, to estimate mileage at six times the actual distances. Consequently, freight rates are high.



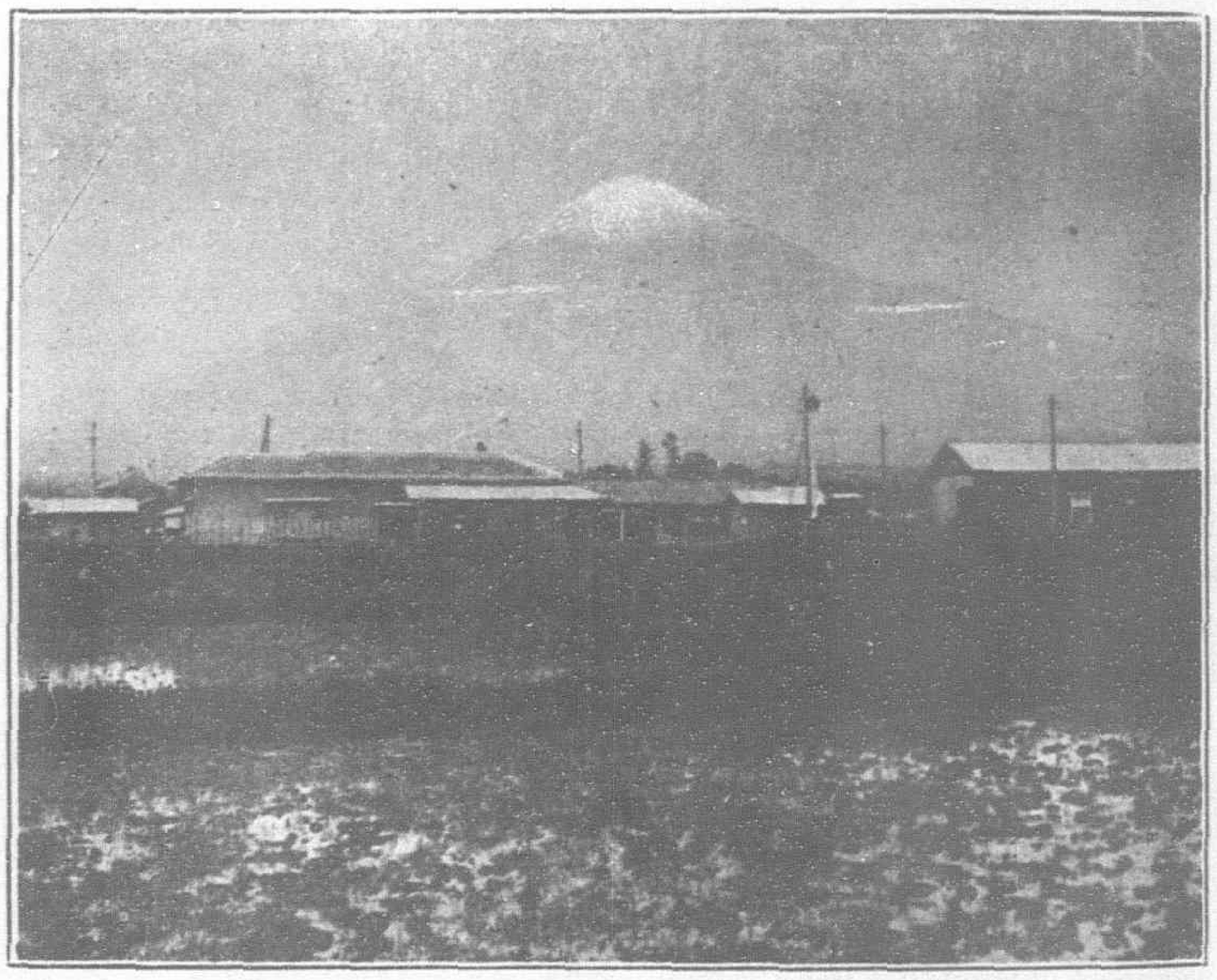
Baldwin Locomotive for the Fuji-Minobu Railway, Class 10-24-¼-D, 103 : Gauge 3-ft. 6-in. : Cylinders 15-in. by 20-in. : Total weight, 84,950-lbs.

Despite the advantages enjoyed by the company it has encountered many difficulties. Most of the construction was carried out at a time when prices were at their highest. Consequently the cost of construction per mile mounted higher and higher every year. The estimated cost of the 26 miles, 79 chains, between Fuji and Minobu, including stations, office buildings, etc., was Y.3,750,000, but by the end of 1920 they had reached Y.4,130,000 and at the end of 1921, Y.4,270,000.

Owing to the rising costs of materials and the consequent expense of laying the line between Omiya and Minobu, a great part of the work was imperfectly done. Shortly after the line was opened to business in 1920, a severe typhoon did much damage to the line, necessitating a further outlay of Y.600,000. for reconstruction.



Toyotsu River Bridge, Fuji-Minobu Railway



Omiya-Machi Station, Fuji-Minobu Railway

The cost of construction has gradually exceeded the paid-up capital and to meet its obligations the company issued long-term bonds for Y.2,000,000. The authorized capital is Y.4,000,000, of which only Y.3,200,000 is paid up. At the end of 1921 the legal reserve of the company amounted to Y.40,308.

If the cost of the line between Fuji and Shibakawa is deducted from the Y.4,270,000, it at once shows that the cost of the line between Shibakawa and Minobu is three tines more than that section. According to the company's business reports the value of the line and buildings, between Fuji and Shibakawa, was estimated as follows :

1916, December 31, at	Y.848,000
1917, June 30	851,000
1918, December 31	855,000
1918, December 31	857,000

The length of that section is 11 miles, 64 chains, so that the average construction cost per mile was between Y.72,500 and Y.72,600. But the cost of construction between Shibakawa and Minobu, including stations and office buildings, amounts to Y.3,500,000 in all, and as the line is 15 miles, 15 chains long, its construction costs per mile were more than Y.235,000.

At such a cost it seems unprofitable to extend the line, but if the entire cost of construction to date is divided by the entire length of the line, it brings the cost per mile down to Y.154,500. This is a little more than twice the cost of the line between Fuji and Shibakawa and, considering the nature of the country, is not exorbitant.

When this railway was first opened to business the greater part ran through rice fields and freight was then the principal source of revenue, the Fuji Paper Mill Co., Ltd., being the principal shippers. This company now pay Y.20,000 a month in freights. Next comes the transport of logs and lumber. In order to increase the freight revenues, an extraordinary meeting of the shareholders was held in May, 1918, to approve the organization of a subsidiary company to engage in timbering, charcoal and acetic acid manufacture, together with afforestation along the line of the railway. Official permission was given for this enterprise and since 1920 the company has been actively engaged in cutting timber and preparing to manufacture charcoal. For this business during the second half of 1919, an expenditure of Y.34,304 was provided for, increased to Y.88,892 in the second half of 1921. The loans raised have been utilized for this enterprise.

Experience in Japan has shown that railway companies (such as the Fuji-Minobu), whose income depends more upon passenger traffic than on freight, make greater profits when electrified. During the war and in 1920, the price of coal was almost prohibitively high and has not yet come down to an economical level. With the idea, therefore, of electrification the company instituted an investigation into the cost and feasibility of the change. A report was made in 1921, which showed that great savings could be made by such a step, and in November 25, 1921, the railway department granted the license to make the change.

One of the great advantages of the Fuji-Minobu Railway is its close connection with the Fuji Hydro-Electric Co., Ltd., whose president is also head of the railway company. Power for operating the electric line can be obtained at very low rates from the

Fuji-Suiden, thus obviating the necessity of building expensive power plants.

After electrification, the number of stations along the line will be increased, in accordance with the plans to do everything possible to develop the district. With the increase of population along the line, the Fuji-Suiden will obtain new customers for light and power. So the future development of the Mt. Fuji districts depends in great measure on the co-operation of these two concerns.

The railway company holds a license to build a line between Minobu and Kofu, on the Chou line of the imperial government railways, a distance of 28 miles, 57 chains. When this extension is made the Fuji-Minobu railway will become an important connecting link between central Japan and the sea coast.

Unfortunately the company's application for permission to commence construction seems to be held up in the railway department, and construction is accordingly postponed. It is said that the railway department plans a line between the central line at Kofu and the Tokaido line at Iwabuchi, at the mouth of the Fuji River, to be commenced in 1923 and completed by 1928. The Fuji-Minobu license to build expires in 1926 and it is urged that the railway department sanction the immediate construction, of the Minobu-Kofu link, even though in the near future the line should become nationalized.

PRIVATE RAILWAYS IN JAPAN

A GOVERNMENT report just published shows 253 (private-owned railways in Japan, including 153 open lines on May 1, 1922, 109 with permission to survey, and 92 under construction or about to begin work. The total length of these railways was 4,771 miles and 57 chains; in operation, 2,165 miles and 7 chains; under construction, 1,066 miles and 50 chains, and licensed to survey, 1,549 miles.

The most noticeable tendency in railway construction is the growth of electric lines. Of the lines now in operation, 21 are electric, and 129 steam railways. The lines under construction include 23 electric and 68 steam, while those holding permission to survey include 37 electric and 64 steam railways.

Steam trains were exclusively operated over 1,822.5 miles of the lines now in operation. About 194.4 miles were electric, and 143.4 miles were used by both steam and electric cars. Considering that the number of such mixed power lines is only 7, this mileage is rather high.

The total capitalization of the 253 companies on May 1, 1922, was Y.678,082,427. Estimated costs of construction were Y.691,873,283. Companies in operation were capitalized at Y.328,425,451, and their costs of construction had amounted to Y.196,227,721, on the date of the report. Lines under construction were capitalized at Y.79,726,976, and their estimated costs of construction until the completion of work were Y.112,082,143.

The estimated costs of construction of the lines licensed to survey are greater than the total costs of all lines now in operation and under construction. These lines include the ambitious underground railways for Tokyo. But their actual construction is extremely problematic, it having been found difficult to interest capital, either domestic or foreign, in these plans. Of the total estimated costs of Y.383,563,419, for all these lines, Y.159,000,000 is estimated for the four projected underground railways.

The following table gives details of all the lines now in operation, under construction, or licensed to survey:—

JAPAN'S PRIVATE RAILWAYS, MAY 1, 1922

Power	Number	Mileage	Capital	Costs of Construction, actual and estimated
Steam	191	3,637.06	Y.338,282,427	Y.318,788,131
Electric	62	895.56	197,240,000	181,858,690
Electric cable	9	7.32	5,400,000	2,353,337
Electric underground ..	4	44.75	97,000,000	159,000,000
Electric and steam ..	9	175.37	35,590,000	29,248.125
Gasoline	2	8.27	570,000	570,000
Human power	1	2.64	—	55,000
Total	253	4,771.57	Y678,082,427	Y691,873,283

Licensed Railway Construction

The Yamato Tetsudo K.K. (Yamato Railway Co., Ltd.) in Nara prefecture, obtained on June 7, 1922, official permission to extend its line from Sakurai-machi, Isoki-gun, Nara prefecture, to Nahari-machi, Naka-gun, Mie prefecture, 17 miles, 40 chains; gauge, 3 feet 6 inches; electric power. The cost of construction is estimated at Y.3,000,000. The present line in operation is from Tawara Moto, to Shinnoji, in Nara prefecture, 6.3 miles, steam cars. The weight of rails used is 45 pounds.

Government Railways to Complete Double Tracking

During the fiscal year 1922-1923, the Imperial Government Railways will double 100 miles of track. Next to the main line, between Tokyo and Kobe, the busiest section, is the Sanyo line, between Kobe and Shimonoseki. This line, between Kobe and Waki, 71.4 miles, is now double tracked. At a cost of Y.5,000,000 this line is now being doubled in the neighborhood of Wakayama, so that between Kobe and Wakayama all will be double tracked before the end of 1922. The whole line between Kobe and Shimonoseki is to be doubled by the end of 1928, but using certain other appropriations it will be completed by the beginning of 1927.

Electric Machinery Makers Combine

UNDER the mediation of Mr. M. Ota, the managing director of the Keihan Electric Tramway Company, the amalgamation of the Kawakita and Toyo Electric Machinery Companies is reported to be steadily progressing. The amalgamation of electric machinery companies has been planned several times, but in vain. Just after the commercial depression set in, Mr. M. Fukuzawa, then, the president of the Nagoya Electric Lighting Company, induced the Kawakita and the Osaka Electric Machinery companies and the machine manufacturing department of the Osaka Electric Lighting Company of that city together with the Okumura Company of Kyoto to consolidate and the plan progressed as to investigating the assets and liabilities of each company, but failed because the Kawakita asserted a desire to secure the sole selling right of the new consolidated Company's products.

Immediately after that, the three Companies excluding the Kawakita, induced the Hitachi Electric Machine Manufacturing Works and tried to form a consolidated company great enough to compete with the Shibaura Works of Tokyo, but the plan failed also owing to the opposition of the creditors of the Okumura Electric Machine Company.

After that no serious attempt at amalgamation has been made, the market being left open for competition among the companies. The Toyo Electric Machinery Works, which is to amalgamate now with the Kawakita, has its head office in Tokyo and is manufacturing motors and other electric tram and steam locomotive machinery.

No. 3 Mill of the Fuji Paper Mill Co., Ltd. in Shidzuoka Prefecture

Paper Making in Japan

The first part of this article is from the Annual Number of the "Paper Trade Journal"; the rest compiled from official sources

THE manufacture of paper in Japan was started in the year of 1873 and since then its progress has been very slow, being influenced by the undeveloped state of Japanese finance and culture in general, which naturally required a limited amount of paper. However, in the year of 1890, one of the promoters of the Fuji Paper Manufacturing Company which is now regarded one of the largest of its kind in the east, was despatched to Europe to study the process of manufacturing paper from woods and on his return a factory was established at the foot of Mt. Fuji. At the time, only one machine was run in making paper, the output of which was sufficient to cover the entire demand of all the news publishers in Japan, and leave a surplus of 30 to 40 per cent. According to what the records tell us, that surplus was a hard knot to dispose of. Since then, the industry has made a rapid progress. But at the time of the Russo-Japanese war, the expense of producing paper in Japan was so great as compared with that in America, Sweden and Norway, that paper manufactured in those countries was cheaper, even with freight and duty added.

In the year 1906 just after the Russo-Japanese war, Japan began utilizing woods produced in Hokkaido, north extremity of Japan, in making paper. Woods in Japan proper are generally regarded unsuitable for the purpose because of poor quality and comparatively high price. "Ezo Pine," or Abies Sachlinensis, coniferous class of woods, or those produced in the north of the 47th degree of latitude are considered the best for paper making. Woods produced in Karafuto—formerly called "Sakhalin"—a small isle lying north of the Hokkaido and those on the "Coast Province" of Eastern Siberia are also considered adaptable.

At that time even the most skilled workman was able to produce only 200-ft- a minute with a machine 75.6-in. wide which was the largest in Japan then.

Beginning of a New Era

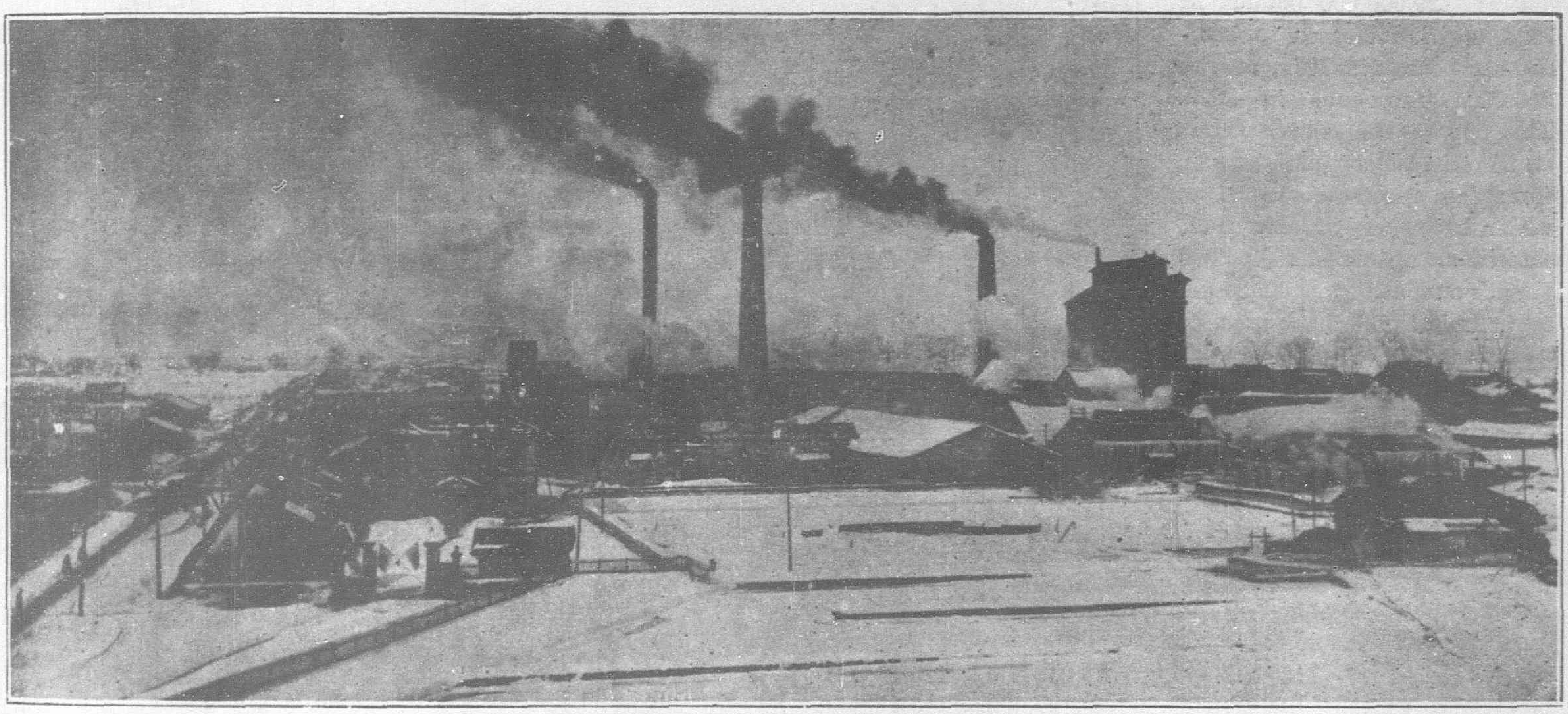
In August, 1921, however, the Fuji Paper Mills installed in their Hokkaido plant a machine 186-in., wide. This machine was started in November, producing at the rate of 800-ft. a minute a speed four times as great as the first machine mentioned. This clearly indicates the rapid progress Japan has made in recent years. At present, Norway and Sweden are very skilful in making the thinnest paper, while America makes it a distinctive feature to produce the thick paper most quickly, therefore Japan, after making elaborate efforts and taking into consideration the strong points of those countries, is now making news print of substance between America and Sweden. Further she is doing her best to make paper at as cheap a rate of production as possible, by producing a large amount of paper with as little material as possible. Formerly, materials were brought to the paper factories on workmen's shoulders or on carts and when paper was required to be reeled on roll, such paper had to be sent on to another factory for the purpose, but the present arrangement, requiring no workmen's hands and depending upon the action of machineries exclusively, it is no exaggeration to say that Japan is in no wise inferior to those countries in process of manufacture as in cost of production. While paper manufacturers in general are paying much attention to producing paper at the lowest rate of expense, they are endeavoring not to give the slightest uneasiness to employees. Therefore, even in time of depression in the year of 1920 they never cut down wages, but instead raised them twice, in February and August 1921. In other words, they make it a point to give better wages but not to employ so many workmen.

Making New Varieties of Paper

Prior to the European war, Japan preferred to make paper that required little trouble or the so-called "cheap class of paper." This was owing to the inferiority of technique when they manufacture any different kinds of paper or thinner ones, inferior qualities were turned out at a high cost of expense. As a result, paper thus produced was sold at less price than it cost. While other countries were making different weights of paper at comparatively cheap cost during the war-time such paper was not imported to Japan in large quantity, therefore being pressed by the keen demands in the home market, various weights of paper had to be manufactured, which was sold at high prices. This was a unique experience for paper manufacturers in Japan. They did not lose money, but rather profited and now Japan can make any grade of paper from woods, straw, rags of qualities not at all inferior to those manufactured in other countries. However, there is one variety in which she is behind America and Europe viz., packing (wrapping) paper. This is because Japan is now using common sulphite-pulp and not using kraft-pulp, which would cause high cost of production. This leads her to hesitate about packing paper at present. In Sweden and Norway, the process of making this grade of paper, has been greatly improved. With a view to following this process, Japan sent a few people to these countries to study it a year ago and expects their return very soon. When this process is mastered Japan may be said not to be behind any paper making country in the world.

Paper Manufacturers' Association Formed

In Japan, leading paper manufacturers organized the Paper Manufacturers' Association some time ago with the idea of improving the art, fixing selling prices, etc. Prices of paper were at high level up until the middle of April, 1920, when the paper market in the city became demoralized. Generally speaking, in the months of June, July, August, demands for paper are always less simply because of the short-nights which naturally afford not much time for reading papers, magazines, etc. The months of September to November are called the reading season, when demands are largest of the year. Therefore all manufacturers expect an unusually big demand in the month of September. But anticipated sales did not materialize and therefore the Paper Manufacturing Association decided to limit output by 20 per cent. in the latter part of December, 1920. Why had they taken such a step ? Prices of commodities were declining all over the world and if the matter were left alone, the paper market in Japan would be thrown into a chaotic condition rapidly, therefore the limitation system was taken up in order to lower the prices of paper gradually. If prices of paper were forced down at a bound, paper dealers as well as manufacturers themselves would naturally suffer from the financial operation, in view of which manufacturers gave as much accommodation as possible in every respect to leading paper dealers, lowering prices very gradually. As a consequence, at the end of October, 1921, stock of paper decreased as greatly as 40 per cent. when there arose a question about withdrawing the limitation of output, and it is possible that this may be done soon. Be that as it may, the Paper Manufacturers' Association is indispensable for the promotion of the paper business in Japan, in view of the fact that through the association the paper market in Japan had not been thrown into confused state by the worldly depression.



The Ebetso Mill of the Fuji Paper Mill Co., Ltd., in the Hokkaido

Amount of Paper Manufactured

As regards the amount of paper manufactured in Japan—that is paper manufactured by members of Paper Manufacturers' Association—the appended list will explain all details. Needless to say that list does not include the manufacture of so called Japanese paper, such as tissue, Torinoko, and strawboard paper. According to the investigation made public recently, the total of paper Japan consumes in one year would amount to 700,000,000 pounds. If this figure be apportioned to Japan's population, it amounts to 12 pounds per head per year and according to what we learn about foreign countries, in the year 1918, France is said to have consumed 48 pounds, British Empire 50 to 55 pounds, the United States of America 58 pounds, while China consumed only 2 pounds. Speaking about prior to the European war, European Russia consumed 22 pounds per head, Asia-Russia 7 pounds, while Japan consumed about 10 pounds. What surprises us most is that the consumption of the United States of America in the year 1920 was figured at 112 pounds per head. From the above, Japan seems far behind the advanced countries, while it is specially amazing to note the rapid progress the United States of America has made in recent years.

Demand for Paper Increasing

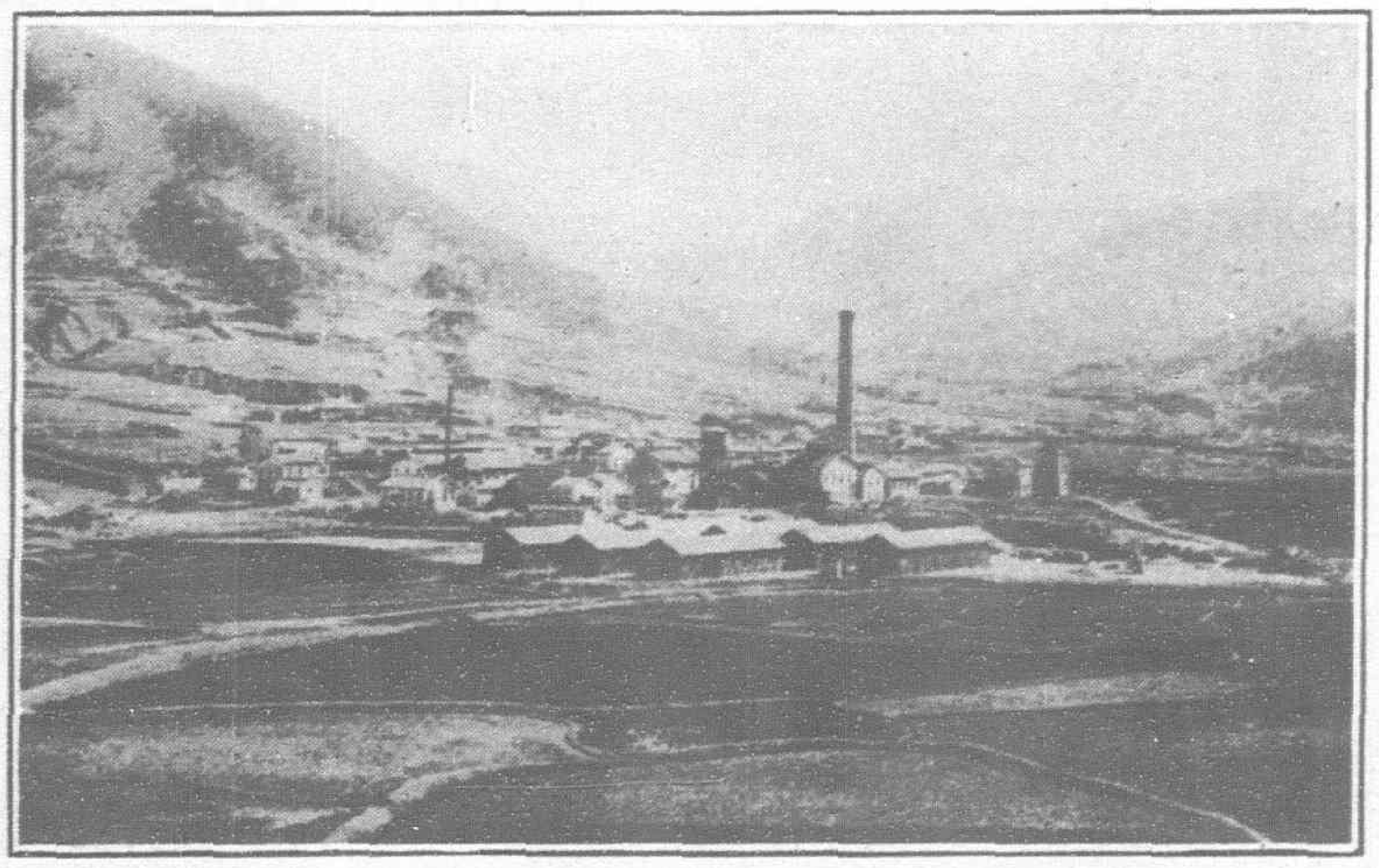
Demand for paper in Japan is increasing at the rate of over 10 per cent. per year. While at present, the supply of paper seems not to equal the demand after two years it is obvious that demand will make such increase that supply will become short. Notwithstanding this, Japan proper or even Hokkaido are no longer in a position to meet such increasing demands, but they may be met by Karafuto. Fortunately, during the European war, three pulp-factories were established in Karafuto the output of which will amount to about 80,000 tons per year. This 80,000 tons not being sufficient to meet the home demand, Japan is now importing about 50,000 tons of pulp from overseas countries. Therefore every endeavor is being made for additional pulp-factories in Karafuto. The factories at present are established near the seashore for shipping facilities, but in the inner part of the island, there are many good forests untouched and before long the forest-railways are to be built to reach there. Also there are many good forests on the cost province of eastern Russia with abundant coniferous woods, in which some members of the Paper Manufacturers' Association have already invested capital as the reports put it.

News Print First in Demand

Among papers of various kinds, news print stands first in demand and improvement. In the year 1916, the largest publishers in Japan could only issue 200,000 per day, while to-day some news publishers issue something above 600,000 per day. If, therefore, the improvement continues to such a degree, the news publishers will naturally get their supplies from overseas if the expectation of manufacturing enlargements in Japan are not realized within a few years.

During the war time, Japan had 29 strawboard factories all of which possessed the up-to-date machinery, but at present only 8 factories are run. This, needless to say, is caused by the world-wide depression.

As is shown on the attached list, total amount of paper manufactured declared by the Paper Manufacturers' Association was put at 129,000,000 pounds in 1904, and it increased to 230,000,000 pounds in 1911, and to 559,000,000 pounds in 1920. This 559,000,000 pounds shows an increase of four times as much compared with that of 1904, within 16 years. October, 1921, showed an output of 45,000,000 pounds a month to which 20 per cent. limitation being added, it represents 54,000,000 pounds monthly or 600,000,000 pounds per year. That is to say, the last figure will indicate an increase of 13.3 per cent. per year since 1904.


Plant of Chosen Pulp Manufacturing Company, Kiho, South Keisho Province

Paper Manufactured, Exported and Imported

Years		Amount Manufactured, lbs.	Amount Imported, lbs.	Amount Exported, lbs.
1904..	..	129,215,000	34,046,000	11,014,000
1905..	..	134,441,000	76,336,000	11,042,000
1906..	..	132,432,000	79,257,000	19,396,000
1907..	..	147,296,000	89,890,000	14,044,000
1908..	..	148,647,000	65,052,000	9,788,000
1909..	..	162,104,600	90,925,000	7,073,000
1910..	..	191,591,000	92,823,000	14,247,000
1911..	..	228,163,000	74,002,000	9,566,000
1912..	..	251,337,000	77,214,000	13,462,000
1913..	..	295,893,000	80,038,000	794,000
1914..	..	327,614,000	54,190,000	14,406,000
1915..	..	367,579,000	27,068,000	26,937,000
1916..	..	405,468,000	35,694,000	55,427,000
1917..	..	455,000,000	16,637,000	69,485,000
1918..	..	498,965,000	34,277,000	72,815,000
1919..	..	519,142,000	56,303,000	66,352,000
1920..	..	559,835,000	56,879,000	51,049,000

Not including straw board.

There are many paper manufacturing companies in Japan, the greater number of whom belong to the Paper Manufacturers' Union. These companies consume on an average some 150,000 tons of pulp in a year, of which mechanical pulp amounts to about 70,000 tons, and is supplied from home sources, while chemical pulp—80,000 tons—comes as to half from abroad, 30,000 tons from Hokkaido, and 10,000 from Karafuto.

The following table gives the production of foreign paper by the members of the Paper Manufacturers' Union in 1919 :—

Manufacturer.		Output for 1919. lbs.
Oji Paper Mill	.. ..	192,222,621
Fuji Paper Mill	.. ..	144,208,932
Mitsui Bishi Paper Mill	.. .. ..	51,076,880
Kyushu Paper Mill	.. ..	28,513,622
Kokura Paper Mill	.. ..	20,446,684
Yokkaichi Paper Mill	.. ..	17,927,951
Kiso Industrial Co.	.. ..	15,843,796
Central Paper Mill	.. ..	14,365,566
Tokyo Pasteboard Mill (excluding pasteboard)		12,979,192
Hokuyetsu Paper Mill (excluding pasteboard)		6,265,745
Kumano Paper Mill	.. ..	4,004,649
Umedzu Paper Mill	.. ..	3,904,710
Naknoshima Paper Mill	.. .. ..	3,649,736
Yukosha Paper Mill	.. ..	2,378,859
Total ..	..	517,788,943

Of this total, newsprint accounted for 229,761,192-lbs.; common printing paper for 81,985,399-lbs ; fine printing paper for 72,736,622-lbs.; and packing paper for 23,560,728-lbs. The total manufacture of 519 million pounds odd compares with 499 millions in 1918 and is no less than 192 millions greater than the Union's production in 1914.

As regards exports in 1919, printing paper totaled 29,082,000-lbs., valued at Y.6,461,332; and pasteboard 29,526,000-lbs., valued at Y.2,900,803. The total exports were valued at Y.33,340,277. The principal customers were China, Y.10,273,758 ; Kwangtung Province, Y.4,744,544 ; Asiatic Russia, Y.3,304,617 ; Hongkong, Y.1,970,845 ; and India, Y.1,390,970.

The Japanese Paper Market

Since the war the United States, in marketing paper in Japan, has met with exceedingly keen competition. As a result the American position in the Japanese paper import trade has suffered conspicuously during the last two years. In the following table is shown the recent decline in importance of the United States as a source of paper for Japan compared with Great Britain and other countries :

Country.		1919	1920	1921
		Yen.	*Yen.*	*Yen.*
Great Britain ..	..	1,690,948	3,614,170	2,125,073
United States ..	..	15,678,018	8,770,118	4,196,360
Other countries	..	1,017,926	5,023,982	6,053,298

Note.—One yen equals about 50 cents.

Competition Affecting American Paper Exports

This remarkable decrease in the proportion of the trade held by the United States is due to the return of Scandinavian and German competition. At the present time Americans generally are out of the market, except in certain lines, such as bond and ledger paper. European competiton is extremely keen, and European manufacturers are now able to offer goods at lower prices than can American manufacturers.

The figures below show the imports of various kinds of paper into Japan in the year 1921:

Paper imports into Japan, 1921.

Kinds of paper.	1921 Pounds.	Value.
Printing paper:		
Weighing not more than 58 grams per square meter	6,346,266	$444,808
Other	14,588,933	1,764,213
Writing paper	1,700,000	329,709
Packing paper and match paper	18,995,733	1,932,018
Pasteboard and cardboard	2,464,133	363,162
Tissue paper	1,813,733	264,404
Imitation parchment, paraffin paper and waxed paper	2,238,933	470,772
Other papers:		
Fancy paper	1,270,400	228,675
Other	..	389,620

The imports in the year 1921 were approximately the same in volume as in other years since the war, but are nearly double those of pre-war years. The principal market for printing paper is Tokyo, the center of the printing industry of Japan, while the principal market for packing paper, cardboard and other industrial papers is Osaka, the industrial center of the country.

Newsprint and Other Papers

Japan is now able to supply almost the entire domestic demand for newsprint, using pulp, a part of which is made in the Hokkaido and a part of which is imported from Canada and Sweden. However, the cost of production in Japan is so high that European (especially German) paper mills can compete. The Japanese mills have been restricting production, with the hope of artificially holding up prices, but this has not succeeded owing to the arrival of newsprint from abroad. American newsprint is practically out of the market, owing to the high prices asked.

Kraft paper, formerly imported from the United States in large quantities, is now coming from Europe and Canada. Waxed paper, glassine, and similar papers, which are used in considerable quantities in the local confectionery and other trades and which were formerly imported from the United States, are now being sold here by German mills at prices at which American mills can not compete. Large quantities of cardboard are being supplied by Canadian mills, whose prices are lower than those of American mills. High-grade glazed paper and cardboard for lithography and color printing are now coming from Germany and Sweden.

The American mills still appear to be able to compete in bond, ledger, writing and other high-grade papers, but European competition makes itself felt.

Pulp Industry of Chosen

The preparation of pulp and pulp wood, like most other mechanical industries in Chosen (Korea), is still in its infancy. The supply of pulp wood is considerable. According to official estimates, there are 13,290,000 acres of forests with trees suitable for pulp wood, mostly along the Yalu and the Tumen Rivers, with an average yield of 8.1 cords per acre. The quantity of spruce and fir available is estimated at 34,751,343 cords. Pulp is also made of a certain variety of reed growing in the marshy river bottoms. All but one of the 23 firms engaged in the preparation of pulp wood are Japanese, employing altogether 940 hands (Chinese and Korean). Their total annual output of pulp wood is 39,000 cords.

There is but one modern pulp mill, with a capacity of 15,000 tons per annum. This mill is situated on the Yalu River and is controlled by the Oji Paper Mills, of Tokyo. The quantity exported in 1920 was 9,208tons, most of which was shipped to Japan.

(Ta be concluded in next issue)

Osaka Public Works for 1923

Waterworks

ONE of the urgent matters before the Osaka municipality is the extension of the water mains. During 1922, 168,990 feet of new mains will be laid and 62,970 feet renewed. During 1923, a new water main to a new district recently opened in the western part of Osaka will be laid. Also, a great deal of pipe will be taken up and relaid as part of the necessary work accompanying the widening of the city's streets. Several other plans which affect the water bureau involve a much larger expenditure during 1923 than in 1922, for which Y.523,000 has been provided. Income from water supplied in 1922 is estimated at Y4,326,000, with an increase of 5 per cent. for 1923.

Drain Improvement

Work is now being carried on for the extension of gutters. This program will take three years to complete and the expense will be met by a loan for Y.4,600,000, recently approved by the municipality, of this, Y.1,850,000 will be expended in 1922 and 1923, and Y. 900,000 in 1924. During the present year the Ichioka Izuo and Sangenya districts will be completed, and in 1923 work will be started upon the streets in the newly opened districts of the city.

Electric Railways

The municipal railways are planning many extensions. A new workshop, No. 2 Kujo power plant, a hospital for railway employees, and reconstruction of the transformer station are the most important projects which the electric railway bureau now have in hand. All this work will be completed in 1922, with the exception of the reconstruction of the transformer station, which will be continued into 1923.

The principal equipment additions for 1923 will be the construction of 66 new tram cars and certain extensions of the line which must be carried out as a result of the widening of city roads. The lines in operation will be extended thirteen miles and part of this mileage will be completed in 1923. To meet the expenses, it is expected that a considerable increase in next year's budget will be made.

Road Construction

A sum of Y.8,000,000 to be used for road construction was carried forward from 1921 to 1922, and it is reported that this amount will be spent in purchasing land necessary to improve the following important roads:—

Kami Honcho, 6 chome, to Tamatsukuri, passing through Kasumicho: Nihonbashi, 3 chome, to Ebisu-machi:

A Road between the main road to Nara and Tamatsukuri Kasumicho. Sotoya-cho, 3 chome, to Ote Dori, Kyobashi.

The purchase of land has been going on for some time and the work of construction between Tami-machi and Kyobashi is to commence soon.

Road construction for 1922 will be carried out with funds from the special city tax which will amount to Y.4,000,000. The imperial sanction for floating city loans to meet road construction expenses not having been obtained. Projected work for 1923 includes widening a number of old roads and the construction of several warehouses for the storing of machines and tools.

Electric Tramway for Pyongyang

A despatch from Pyongyang, Korea, reports that the construction of an electric tramway there was sanctioned on July 3. The work will be started as soon as possible and is expected to be completed in the course of March next year. A double line will be laid on the streets between the railway station and Shinson (Sinchàngli), two miles in length. There will be twelve stops and the line be divided into two sections, the fare for one section being 5 *sen*. Ten cars will be used.

Electrical Developments in Japan

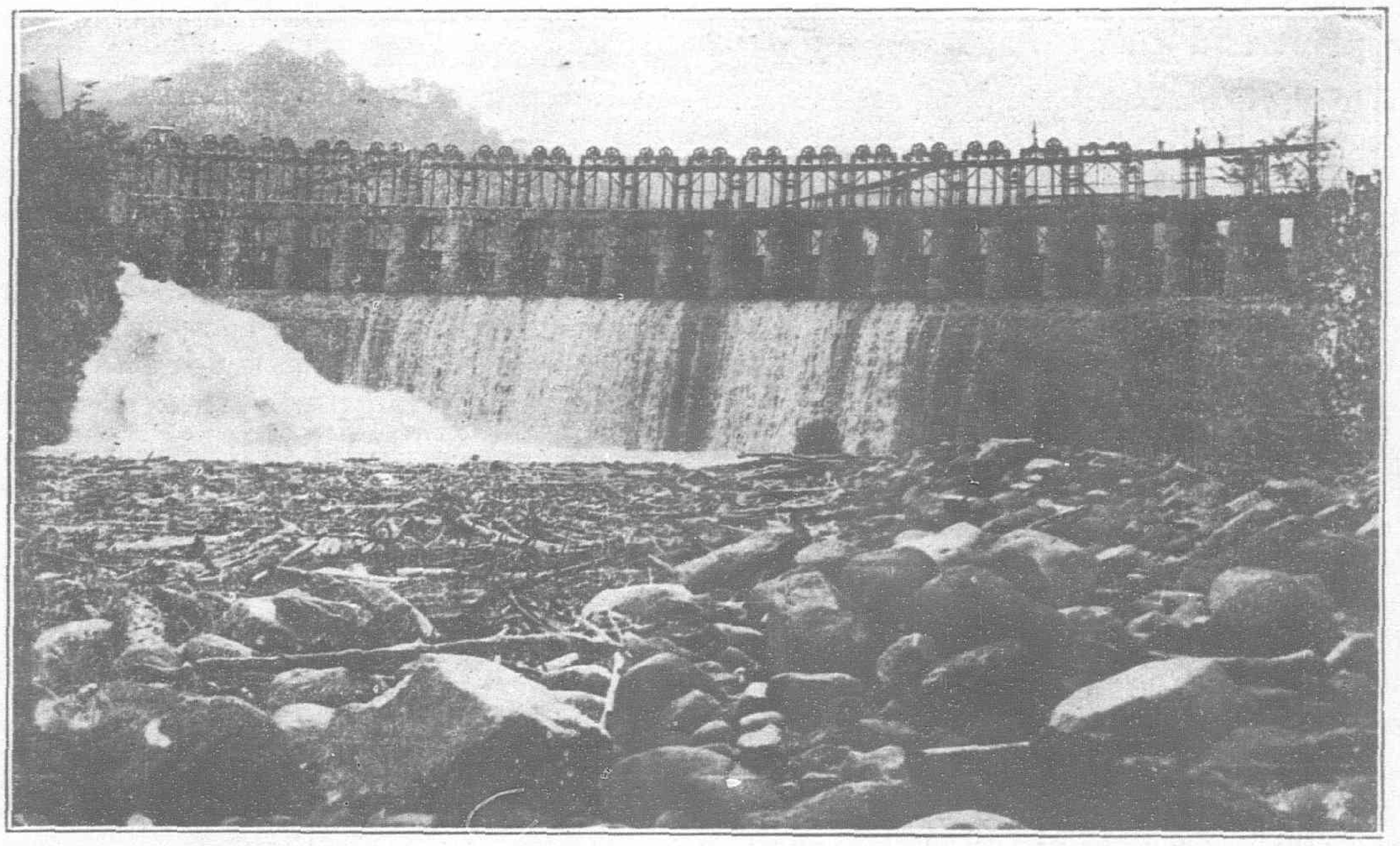
The Kansai Denki Kabushiki Kaisha

SINCE Japan entered a period of industrial re-organization, there have been many electric companies which have amalgamated their interests. The Kansai Denki K.K. was the first company to effect these amalgamations, and it has now the greatest number of other companies absorbed in its organization.

The Kansai Denki Kabushiki Ksiaha is the name of the amalgamated interests of the Kansai Suiryoku Denki K.K. and the Nagoya Dento K.K. Contrary to the usual methods of such amalgamations the Kansai Suiryoku Denki K.K., capitalized at only Y. 4,500,000, absorbed the Nagoya Dento K.K., capitalized at Y.48,487,000.

Between the Kansai Suiryoku and the Nagoya Dento there was a great difference in the value of their properties and also in the market value of their shares. On amalgamating, therefore, the value of the Nagoya Dento was estimated at Y.16,160,000 more than the value of its outstanding share issues and the amalgamated capital of the two companies was fixed at Y.69,149,000. The shareholders of the old Nagoya Dento received four shares of the Kansai Denki K.K. stock for every three of their own shares held at the time of amalgamation.

Of the combined capital (Y.69,149,000) that of the Kansai Suiryoku Denki K.K. was only Y.4,500,000, the rest represent the value of the properties of the Nagoya Dento K.K. The activities of the new company is centered around the operations of the old Nagoya Dento.



Dam of the Kinugawa Hydro-Electric Co., at Kurobe, Tochigi Prefecture

Prior to the amalgamation effected on October 18, 1921, the Nagoya Dento had absorbed the Gifu Denki K.K., the Toyohashi Denki K.K., the Itatorigawa Denki K.K., the Okita Denki K.K., and the Mino Denka K.K. (Mino Electro-Chemical Co., Ltd.). In effecting these combinations with its own interests the Nagoya Dento allowed increased estimates of value to the Toyohashi Denki K.K., the Gifu Denki K.K. and the Okita Denki K.K., while it accepted at slight under-valuations the property of the Itatorigawa Denki K.K. and the Mino Denka K.K.

In effecting these amalgamations the Nagoya Dento increased its capital by Y.14,737,000, of which Y.9,180,000 was paid up. Of this increased amount, something like Y.2,700,000 was based on the increased valuations allowed for the properties of the three companies. This increase, however, had no ill-effects on the Nagoya Dento whose operations thereafter proved the value of its procedure.

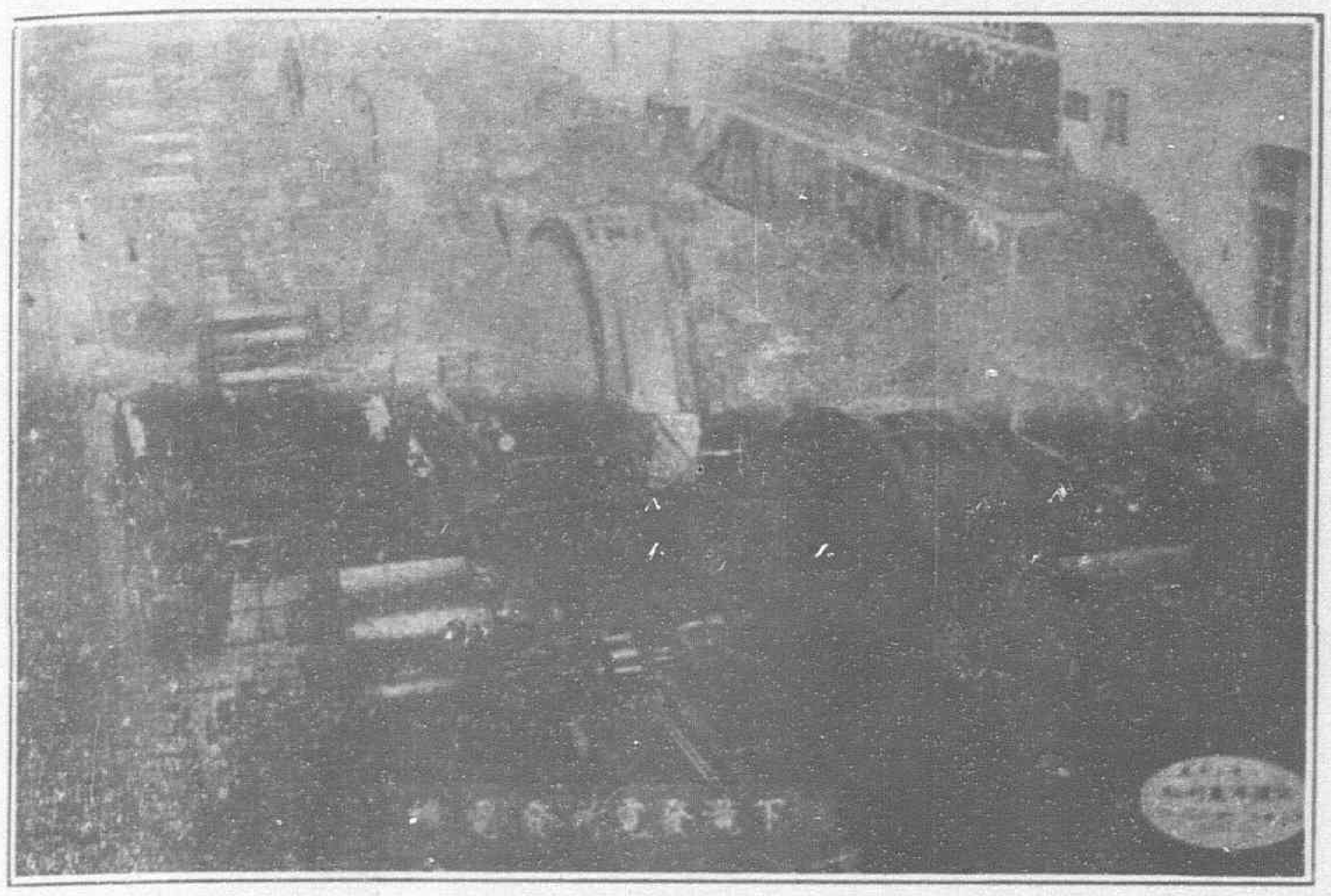
With the amalgamation of the Kansai Suiryoku Denki K.K., the property of the Nagoya Dento was overvalued by Y.16,160,000, about one-third of the total capital. There now exists a fairly big difference between the value of the property of the former Nagoya Dento and its properties in the amalgamation with the Kansai Suiryoku.

Since the completion of the merger in October last year, the Kansai Denki K.K. has absorbed the Chita Denki K.K. and the Tenryugawa Suiryoku Denki K.K. It is also announced that negotiations are now under way with the Yamashiro Suiryoku Denki K.K., the Hokusei Denki K.K., the Aiki Denki K.K., the Toki Suiryoku Denki K. K., the Kyushu Dento Tetsudo K.K., the Yawata Suiryoku Denki K.K., the Bishu Denki K.K. and the Nagoya Gasu K.K., having for their purpose the close co-operation, or eventual amalgamation into one organization of all these interests.

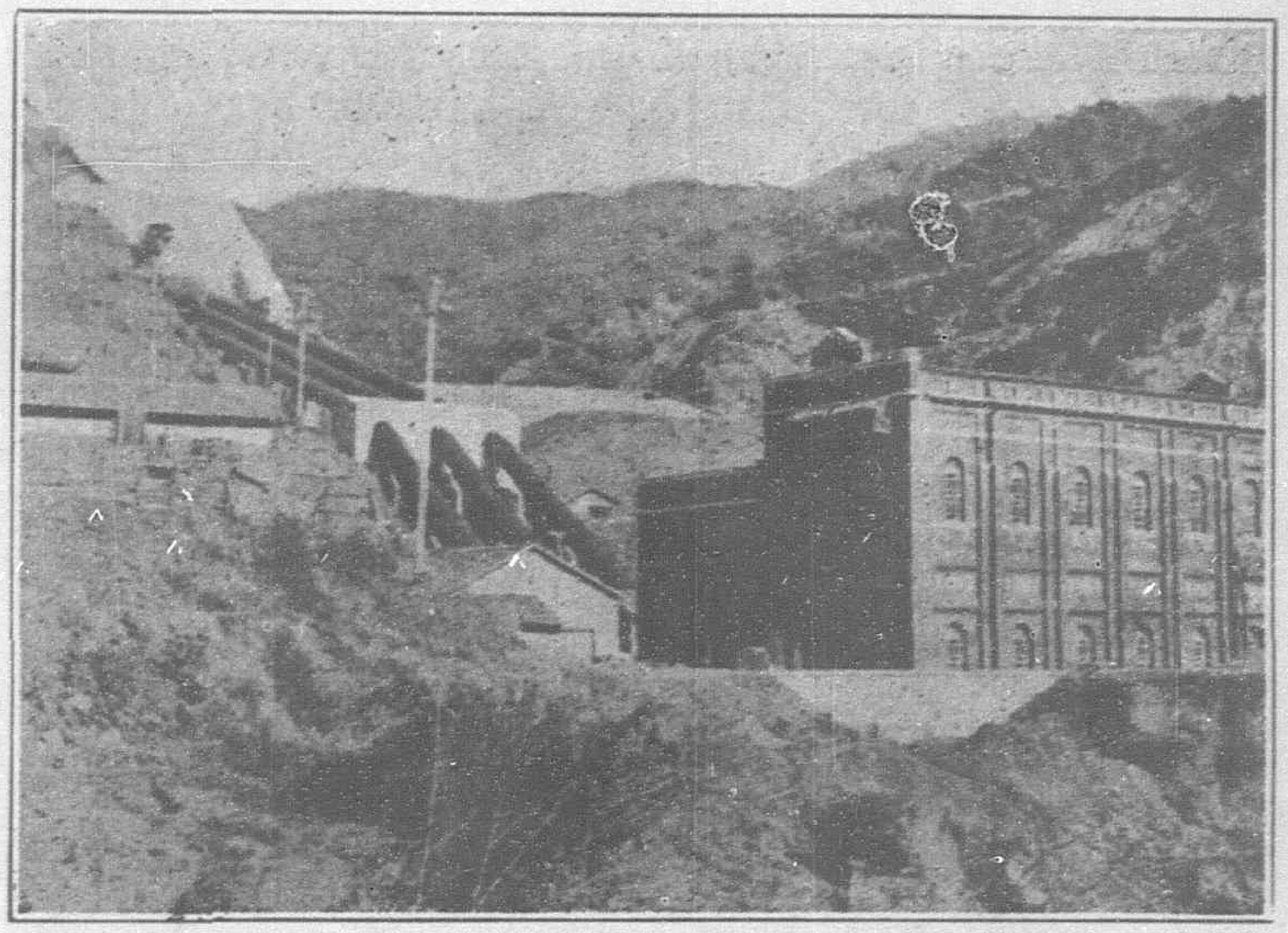
After absorbing the Chita Denki K.K. and the Hokusei Denki K.K., the Yawata Suiryoku Denki K.K. and the Bishu Denki K.K., the company will have increased its capital to Y.139,800,000, of which Y.99,990,000 will be paid up. It is evident that the properties of these four companies have been much overvalued, for the purpose of the amalgamation, the most ambitious of its kind in Japan to-day. After this capital increase is effected, the Kansai Denki K.K., will rank next in importance to the Tokyo Dento K.K., Japan's premier electric company. Comparing the proposed capital, of this combine with that of the Nagoya Dento in January, 1921 (Y.33,750,000, of which Y.21,000,000, only was paid up), the increase during the past eighteen months has been remarkable, almost Y.110,000,000. Such a rapid expansion of capital is unique in the history of Japanese industries.

As a result of all these mergers the Kansai Denki K.K., has added to the scope of its operations an electric railway, a gas plant and a factory for producing chemicals by electric processes. In the days of the Nagoya Dento its whole business was the supply of power. The area of its operations has, as a matter of course, expanded. They now cover the cities of Gifu, Toyohashi, Hamamatsu and Ise, in Yamato, but Nagoya still remains the centre of its business. It has also commenced to expand its operations in an entirely new field, the south of Japan, where it now owns properties covering the cities of Fukuoka, Sasebo, Nagasaki and Shimonoseki. In all, its business in both districts covers 16 cities, 101 towns and 567 villages. Only one company in Japan the Tokyo Dento covers a larger area.

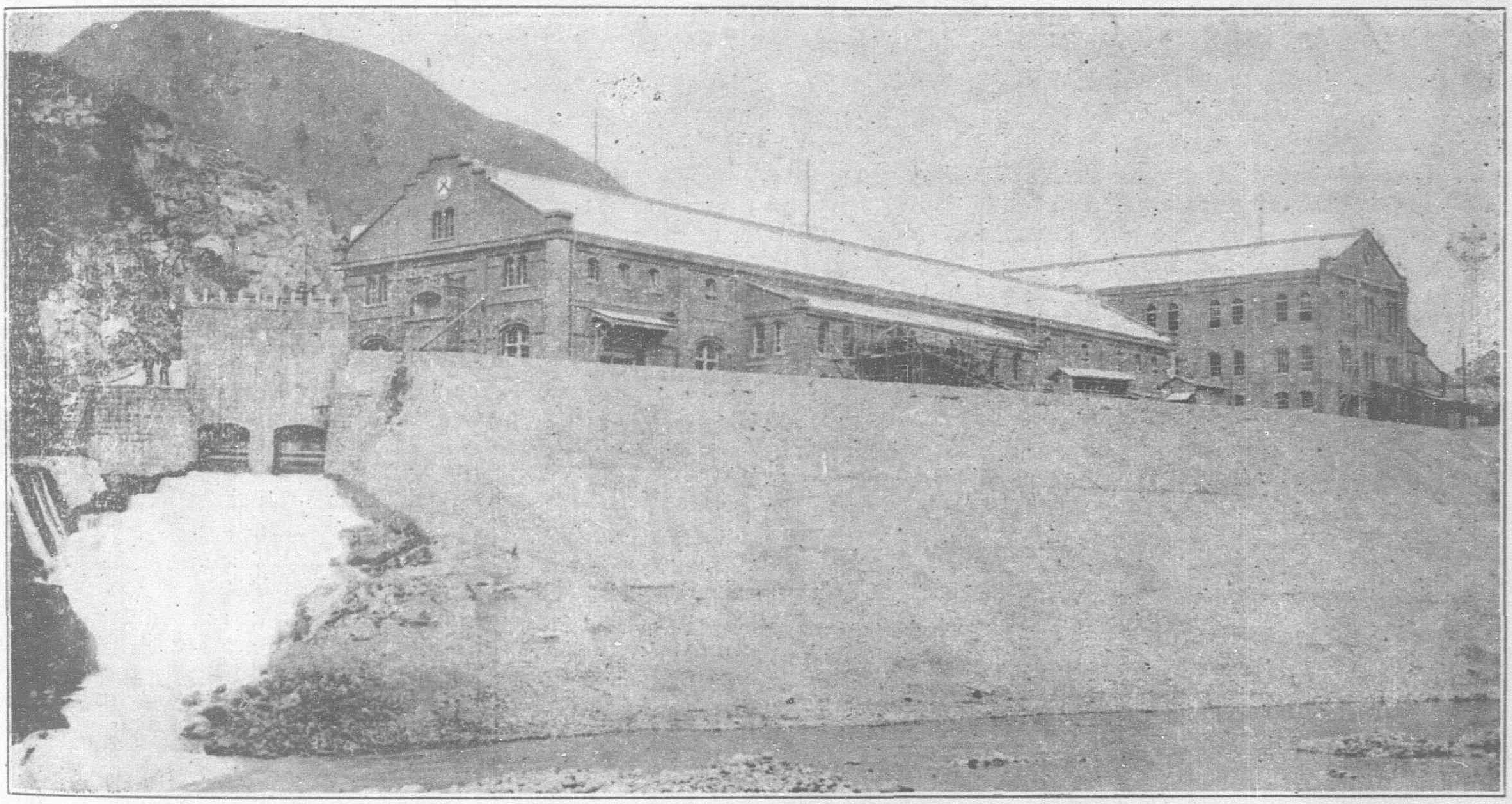
It is important to give some attention to the business of the Nagoya Dento in order to understand the present condition of the Kansai Denki.



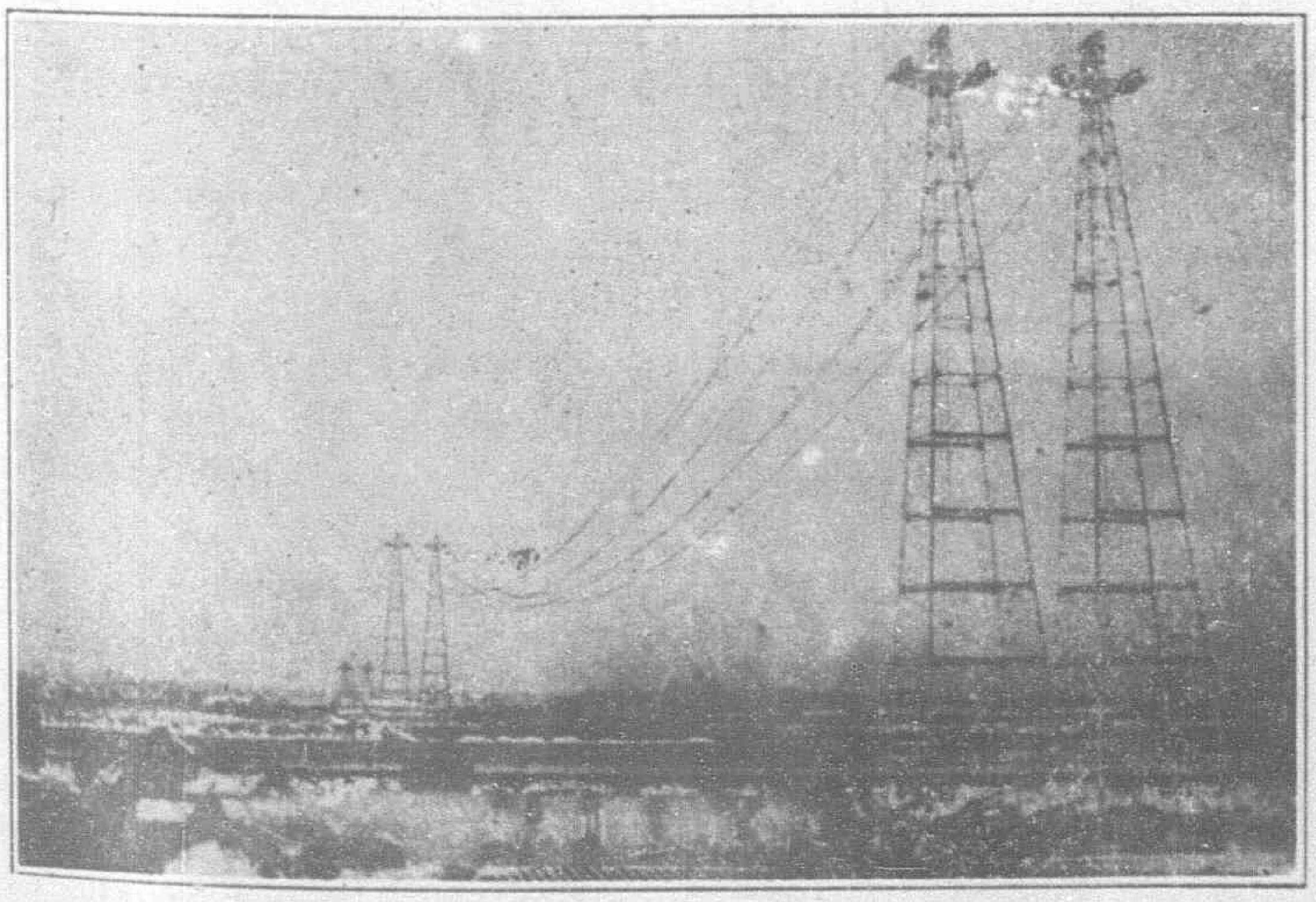
Interior of the Shinotake Power House of the Kinugawa Hydro-Electric Company



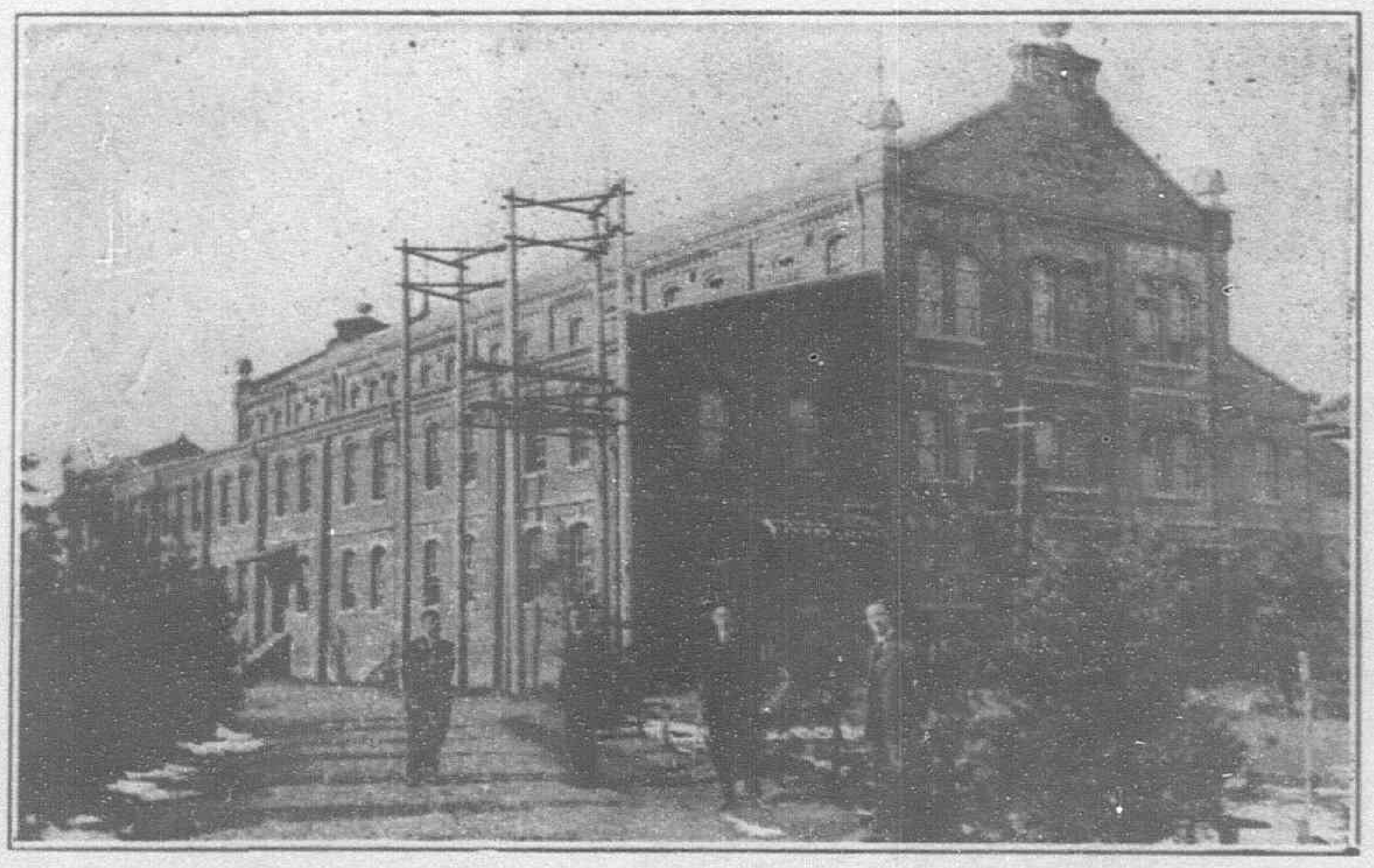
Wakayama Suiryoku Denki Kaisha, No. 2 Power Station on the Hidaka-Gawa



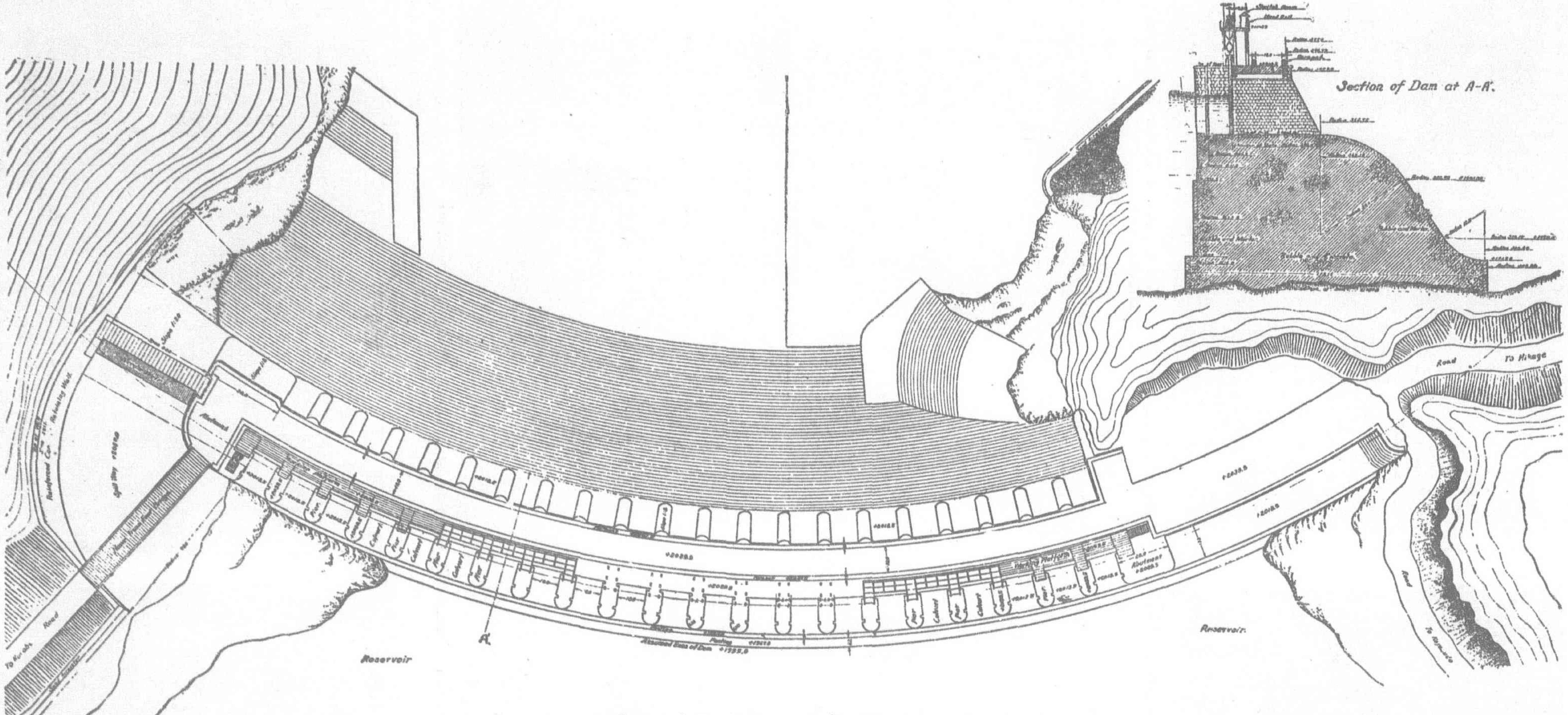
Power House of the Kinugawa Hydro-Electric Company at Shinotake, Tochigi Prefecture



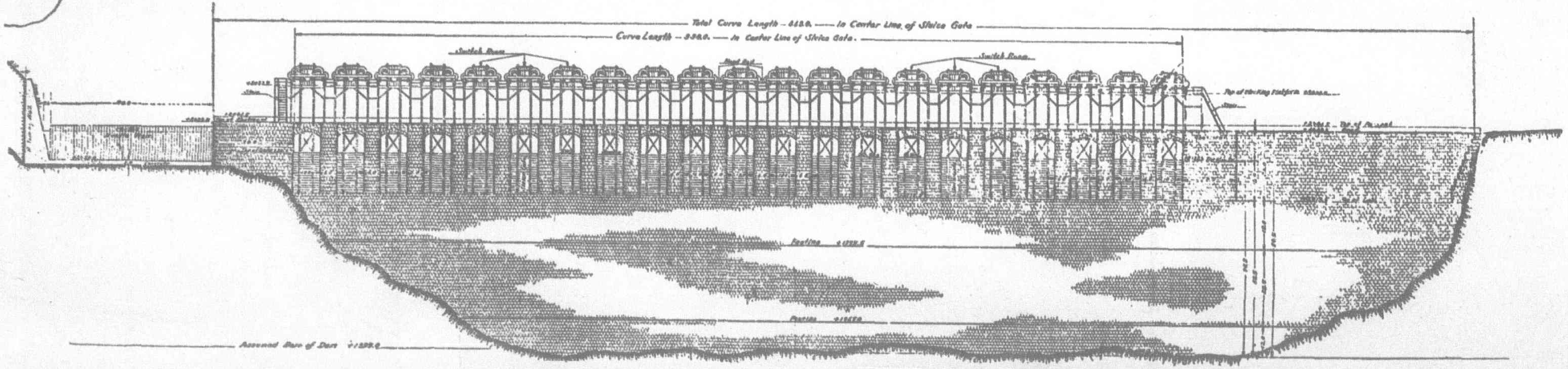
Transmission Tower of the Kinugawa Hydro-Electric Company Crossing the Tone River



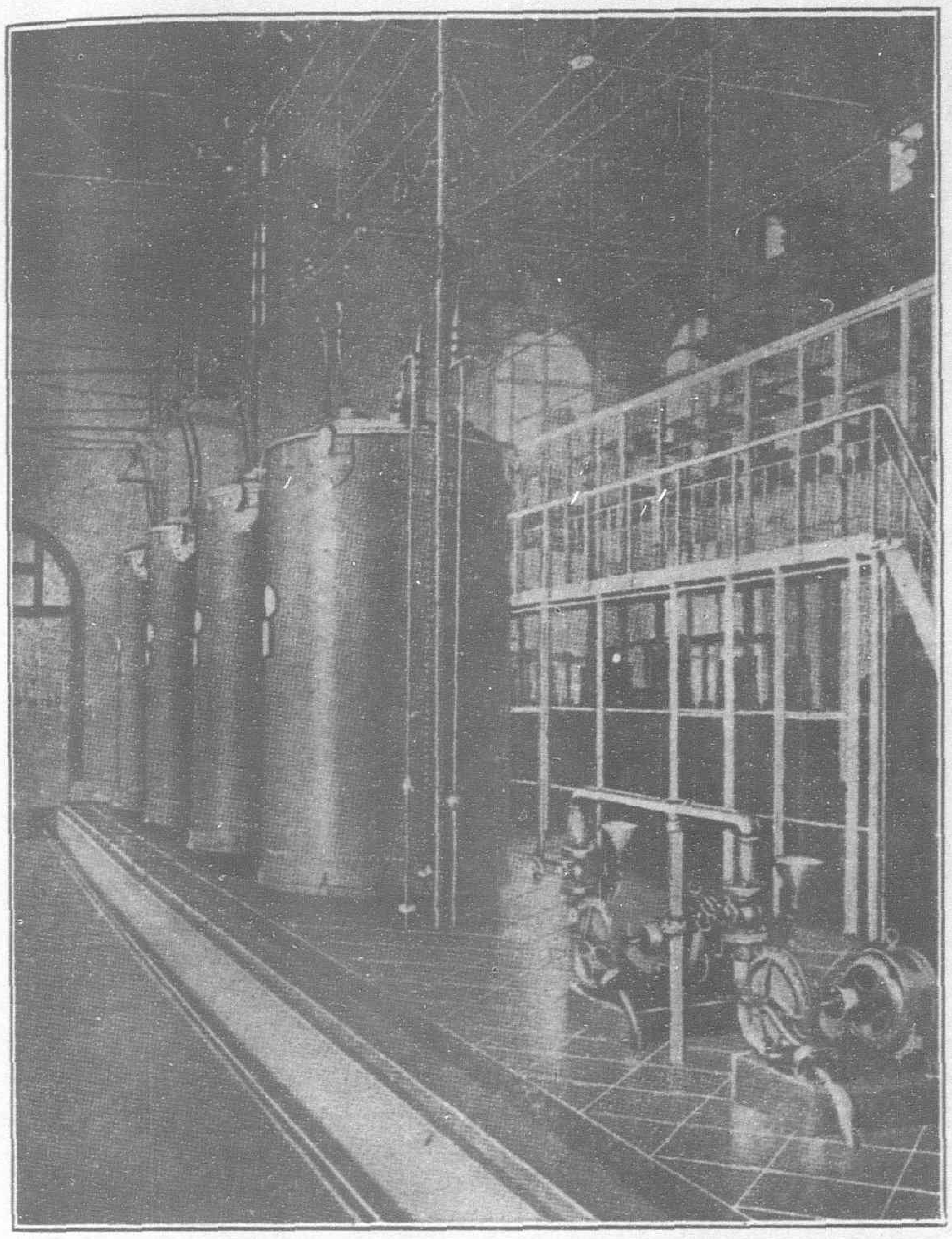
Transformer Station near Tokyo of the Kinugawa Hydro-Electric Co.



General Front View of Kurobe Masonry Dam.


Total Curve Length — In Center Line of Sluice Gate
Curve Length — In Center Line of Sluice Gate
Switch Room
Switch Room
Top of Working Platform
Top of Parapet
Footing
Footing
Assumed Base of Dam

GENERAL FRONT VIEW OF KUROBE MASONRY DAM OF THE KINUGAWA HYDRO-ELECTRIC CO., LTD.



1,800 KV-A. 60,000 V. Water Cooled Transformer; Komazawa Sub-Station of Fuji Gas Spinning Co., made by the Shibaura Engineering Works

The following table gives the working results of the Nagoya Dento K.K., from the second half of 1914, to and including the second half of 1921.

	Average Paid-up Capital	Amount of Profits	Rate of Profit to Paid-up Capital Per cent.	Dividend Rate Per cent.
1914—2nd half	Y.10,637,000	Y.498,000	9.3	8.
1915—1st half	10,637,000	544,000	10.1	8.5
1915—2nd half	10,637,000	547,000	10.3	8.5
1916—1st half	11,050,000	600,000	10.9	9.0
1916—2nd half	11,875,000	754,000	12.7	9.0
1917—1st half	11,875,000	885,000	14.9	10.0
1917—2nd half	12,511,000	985,000	15.7	11.0
1918—1st half	13,112,000	1,150,000	17.5	12.0
1918—2nd half	13,525,000	972,000	14.4	12.0
1919—1st half	13,525,000	1,048,000	15.5	12.0
1919—2nd half	14,762,000	1,405,000	19.0	18.0
1920—1st half	18,875,000	1,470,000	15.7	12.0
1920—2nd half	21,000,000	1,977,000	18.8	14.0
1921—1st half	28,426,000	3,440,000	24.2	20.0
1921—2nd half	44,596,000	3,800,000	17.0	14.0

(The 2nd half, 1921, figures are for the results of business of the Kansai Denki K.K.)

From these figures it can be seen that while before the war, the rate of profit was only slightly above 9 per cent., dividends were 8 per cent. As profit increased, however, its ratio was always greater than the rate of increase in the paid-up capital, consequently it was possible always to increase the dividend. The high dividend of 20 per cent. made in the first half of 1921, was due to the fact that a special dividend of 6 per cent. was distributed to commemorate the thirtieth year of the existence of the Nagoya Dento, and also as a result of the completion of the contracts for the amalgamation with the Kansai Suiryoku Denki K.K.

The continued prosperity of the business of the Nagoya Dento K.K., was due entirely to the increased demand for power which grew out of the industrial expansion of war years. Instead of building expensive power houses for its own use, the company purchased cheap power from others, and distributed it at an enormous profit. This policy was extremely clever at the time, as the company avoided the necessity of tying up a large amount of capital in construction work.

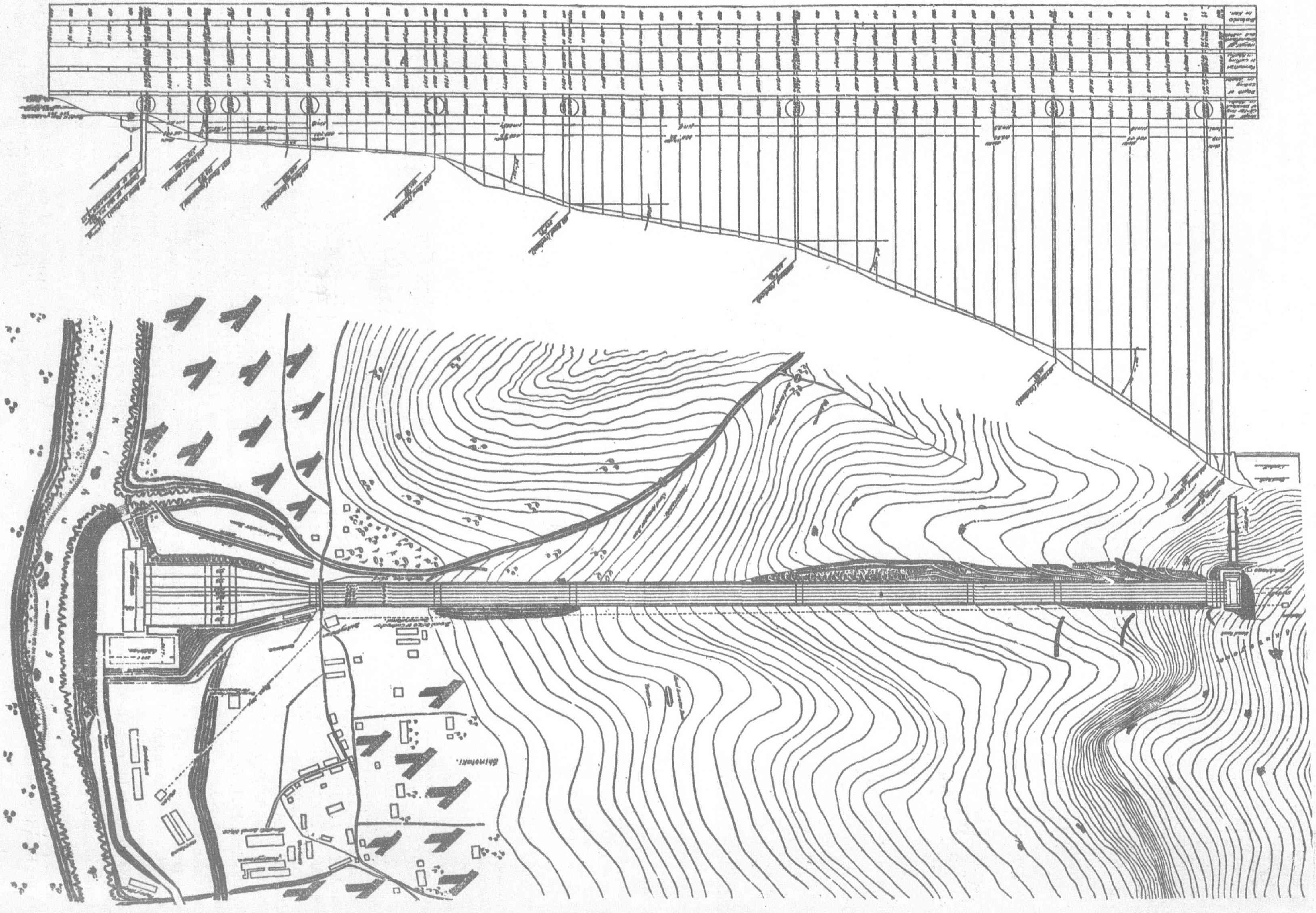
The following tables show the capacity of the power plants owned by the Nagoya Dento at the end of 1914 and at the end of 1920:—

	Dec. 31, 1914.		Dec. 31, 1920
Kisogawa Water Power	7,700 Kw.		—
Magaragawa Water Power	4,000 ,,		4,200 Kw.
Tomoegawa Water Power	750 ,,		750 ,,
Obara Water Power	200 ,,	Yaotsu Water Power	7,500 ,,
		Yaotsu Water Gate, Water Power ..	1,200 ,,
Total	12,650 Kw.	Total	13,650 K.w
Atsuta Coal Power	1,650 Kw.		10,000 Kw.
Lights converted into 10 candle power units	182,024 lights	712,681 lights	
Power sold ..	13,789 H.P.	44,938 H.P.	

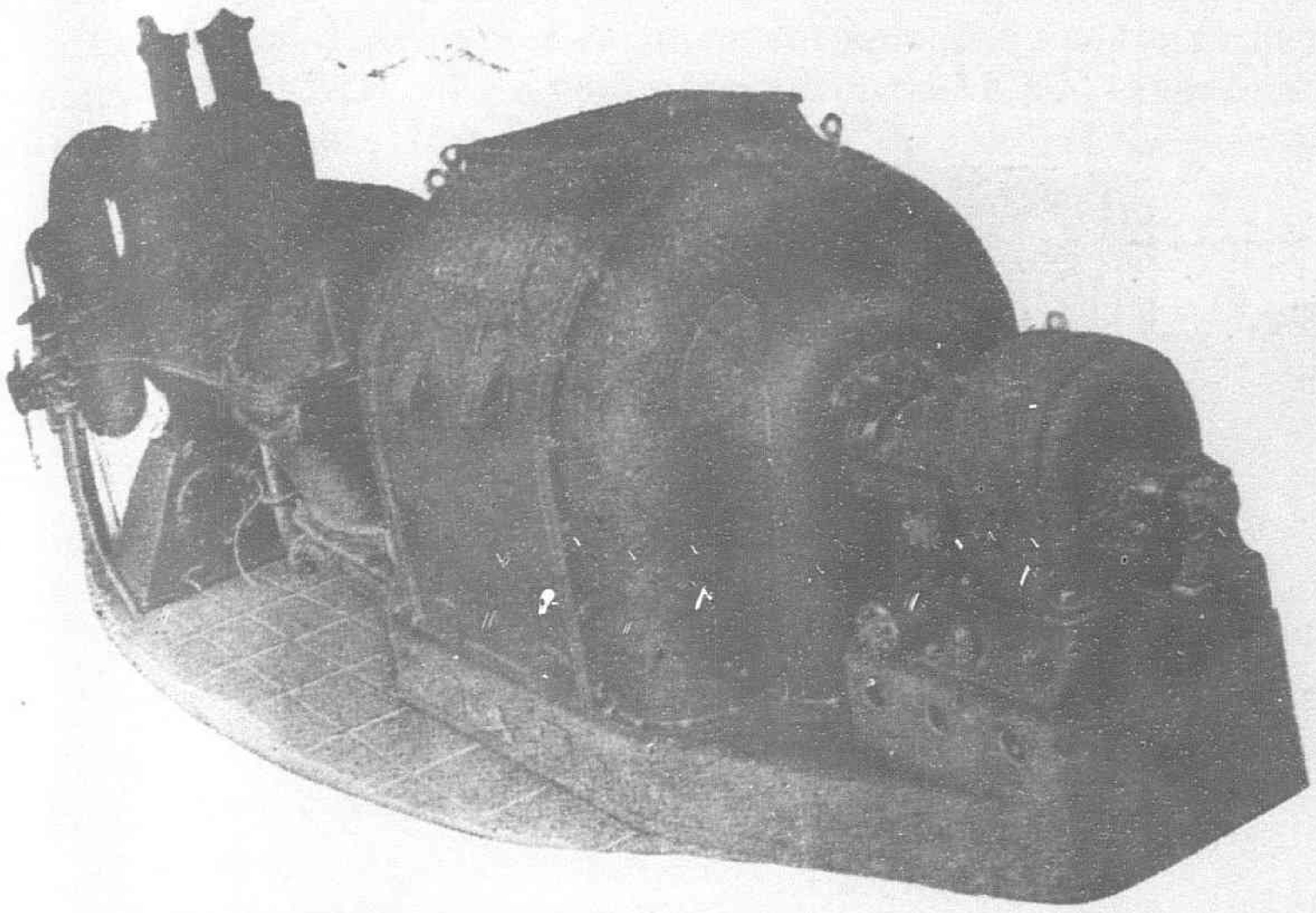
After the various amalgamations were carried out, eventuating in the organization of the Kansai Denki K.K., the power plants owned at the end of 1921 are shown in the following table:—

Yaotsu Water Power			7,500	Kilowatts
Yaotsu Water Gate, Water Power			1,200	,,
Nagaragawa	,,	,, ...	4,200	,,
Tomoegawa	,,	,, ...	750	,,
Kasugawa No. 1	,,	,, ...	350	,,
,, No. 2	,,	,, ...	890	,,
,, No. 3	,,	,, ...	1,800	,,
Nagashino	,,	,, ...	750	,,
Turi	,,	,, ...	500	,,
Shiratani	,,	,, ...	1,500	,,
Yasuge Nos. 1 & 2	,,	,, ...	413	,,
Kamibuchigawa	,,	,, ...	160	,,
Misano	,,	,, ...	35	,,
Nara No. 1	,,	,, ...	200	,,
,, No. 2	,,	,, ...	900	,,
,, No. 3	,,	,, ...	200	,,
,, No. 6	,,	,, ...	197	,,
Total			21,458	,,
Atsuta	Coal Power	.. .. ..	10,000	,,
Nara No. 4	,,	,, ...	300	,,
Nara No. 5	,,	,, ...	1,500	,,
Total			11,800	Kilowatts
Lights converted into 10 candle-power units..			1,296,684	
Power Sold			68,159	H.P.

Before the war the Nagoya Dento supplied only 182,000 ten candle power lights, and 13,700 h.p. for motive power, from a production of 12,650 kilowatts from water power, and 1,600 from coal burning plants, a total of 14,250 kilowatts. Six years later, at the end of 1920, the company was supplying 712,000 lights and 44,900 h.p. for motive power, using 13,650 kilowatts from water power and 10,000 kilowatts from the coal burning plants. Compared with pre-war days, the coal burning plant capacity increased 8,400 kilowatts, but water power only increased 1,000 kilowatts. The coal burning plant was only intended as a supplement to its water power operations, hence it was used as little as possible. But without using the capacity of the coal burning plant it was impossible to supply all the light and power wanted, so the Nagoya



A PLAN ANGLE OF SHIMODAKI HYDRAULIC POWER'S PIPE ROAD (KINUGAWA HYDRO-ELECTRIC CO. LTD.)



1,250 KVA. Turbo-Alternator Built for the Takashima Colliery, by the Nagasaki Works of the Mitsubishi Zosen Kaisha, Ltd.
1,250 KVA., 3 Phase, 50 Cycle,
3,300 Volt, 3,000 RPM., 80% PF.
With Direct-Coupled Exciter Compounded with Leakage Path

Dento purchased from the Kiso Denki Kogyo, some 12,600 kilowatts, at very low rates, in order to meet the demands made on it.

Ordinarily, it requires a large amount of capital to built generating stations which is unproductive during the course of construction and for some time after completion or until the entire capacity of the plant can be utilized. The Nagoya Dento by its policy of purchasing power from others avoided this difficulty and thereby enabled to increase its profits every term.

The first business term after the amalgamation closed at the end of 1921. The water power generated had increased to 21,400 kilowatts and the coal burning plants added 11,800 kilowatts. In addition to the total, (33,200 kilowatts) some 27,200 kilowatts were purchased from the Daido Dentyoku K.K., the Ihigawa Denki K.K. and the Yasaku Suiryoku Denki K.K. With this power 1,296,000 lights and 68,000 h.p. for motive power were supplied.

A casual consideration of the figures given is likely to raise some doubt of the purpose behind the successive amalgamations so hurriedly carried out by the Nagoya Dento after 1919. To get a good idea of the reason it is necessary to examine the progress of this company's expenditure on construction, which is given in the next table:

	Dec. 31, 1914.	Dec. 31, 1920.
Cost of Construction; Water Power Plants	Y.8,007,440	Y.7,888,396
Cost of transmission lines	1,249,234	1,903,012
Total	Y.9,256,674	Y.9,791,408
Electric Light and Power Equipment:		
Transformer station construction expenses	Y.1,115,366	Y.1,588,070
Building distribution lines	1,765,925	4,079,769
Installations	1,564,982	1,564,982
Total	Y.4,446,273	Y.7,232,821
Cost of construction coal burning plant	764,022	1,189,440

At the end of 1921, these expenses itemize as follows:

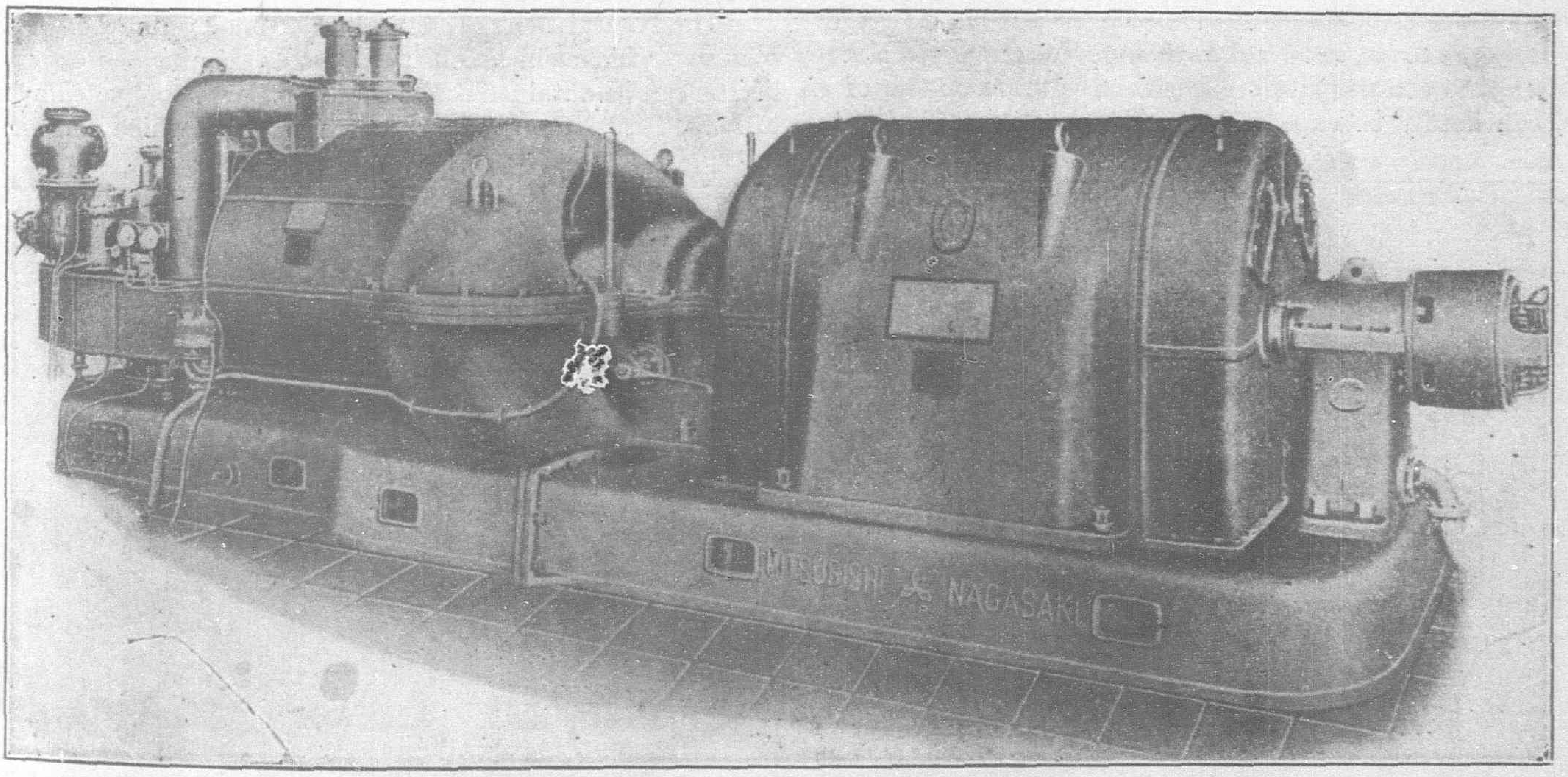
Cost of construction water power plants ..	Y.11,800,658
Cost of transmission lines	2,970,897
Total	Y.14,771,555
Electric light and power equipment:	
Transformer stations construction expenses ..	Y. 3,254,590
Building distribution lines	16,568,539
Installations	3,763,504
Total...	Y.23,586,633
Cost of construction coal Burning plants ..	2,774,494

These figures are compiled by classifying the expenses published in the annual business reports. It is difficult, however, to know whether construction costs be high or low unless they are converted into some formula, such as the cost of construction per light supplied, or per kilowatt.

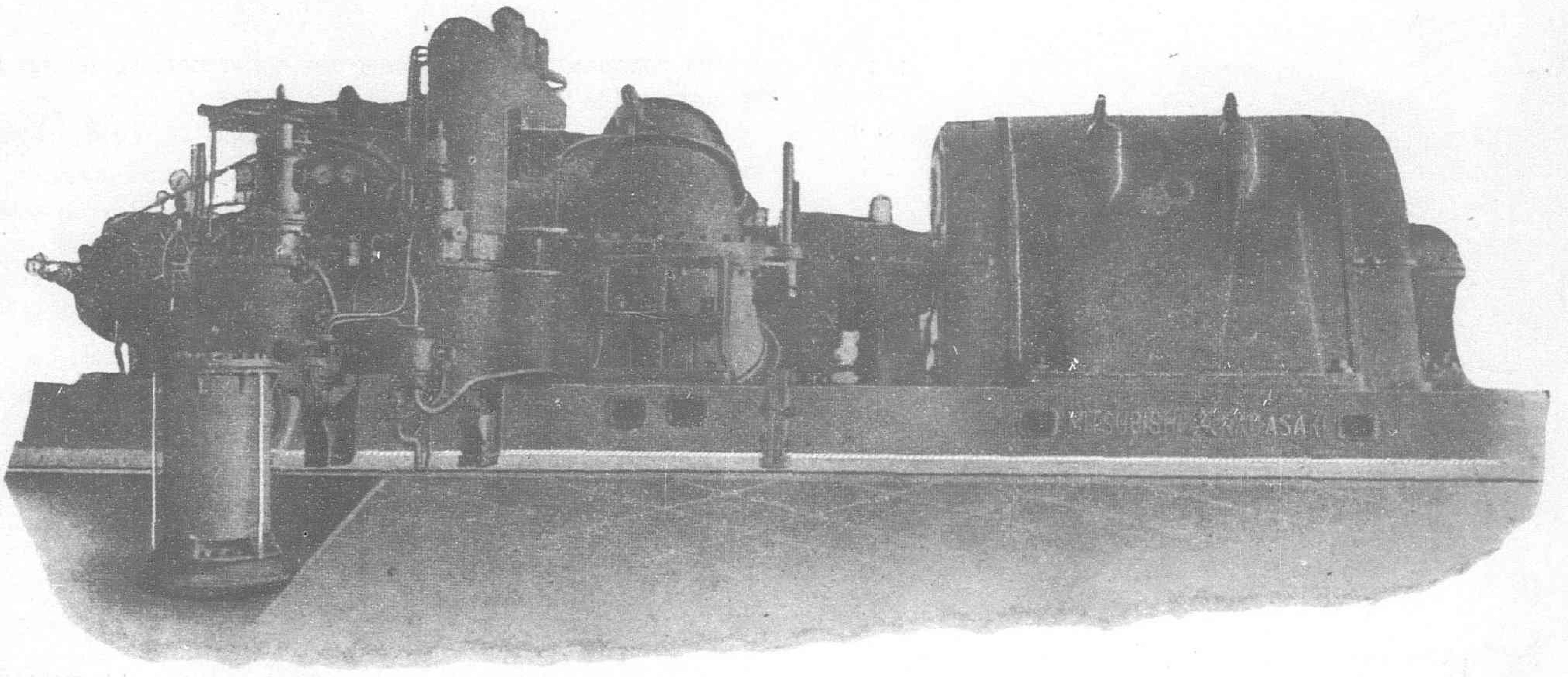
Estimating ten lights as equivalent to one kilowatt, the following table of cost of construction is obtained:—

	1914 Dec. 31	1920 Dec. 31	1921 Dec. 31
Water Power, 1 kilo. ..	Y.731,70	Y.717.30	Y.688.30
Coal Power	477.50	118.90	235.10
Per 10 c.p. light ..	11.80	6.20	11.90

From this table it appears as if there were but little difference in the costs of construction of the water power stations from 1914



3,750 KVA. Turbo-Alternator Built for the Nagoya Dento Kaisha, by the Nagasaki Works of the Mitsubishi Zosen Kaisha, Ltd.
3,750 KVA. 3 Phase, 60 Cycle,
11,000 Volt, 1,800 RPM., 80% PF.
With Direct-Coupled Exciter.



12,500 KVA., Turbo-Alternator Built for the Osaka Dento Kaisha, by the Nagasaki Works of the Mitsubishi Zosen Kaisha, Ltd.
12,500 KVA., 3 Phase, 60 Cycle.
11,000 Volt, 1,800 RPM., 80% PF.
One of 4 Sets

to 1920. In pre-war days, the total capacity of the water power plant. was 12,650 kilowatts. But actually not more than 54 per cent. of this amount was ever used. In 1920, the capacity of these plants had increased to 13,650 kilowatts, but the amount utilized had increased to more than 80 per cent. Although the difference in the cost of construction between 1914 and 1920 was therefore very slight, there was a great increase in the volume of power used.

The increased profits from year to year enabled the company to write off large amounts for replacements. The great decrease in the cost of the coal burning equipment may accordingly be due to the fact that the company wrote off larger amounts for this station than for its water power plants, because it was used only as a reserve supply of power, and consequently its cost of construction was much out of line with its income return.

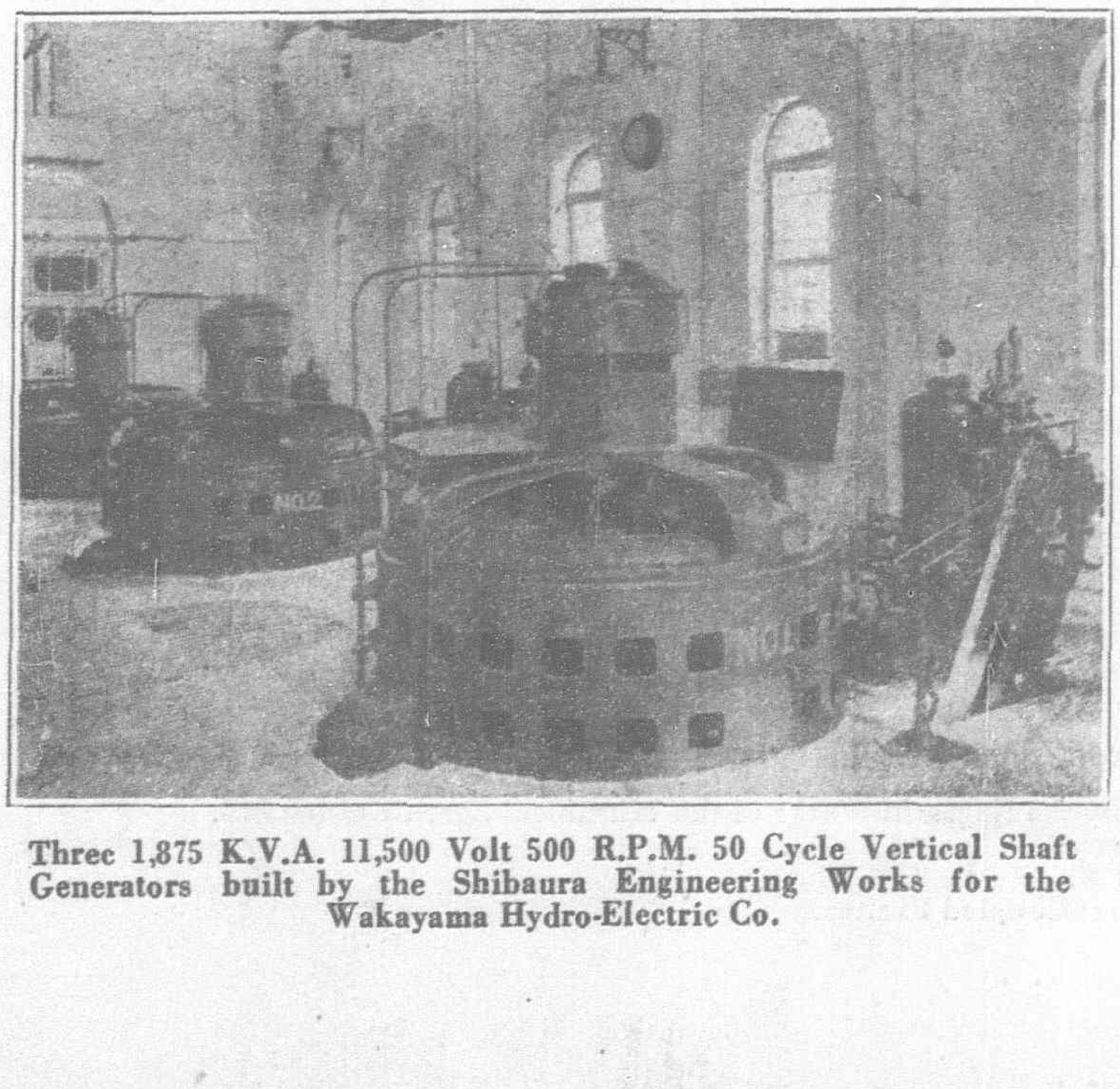
Installations for light and power were increasingly active. Many new customers were obtained who did not need poles erected to ensure their supply. This naturally greatly assisted in bringing down the cost per 10 candle power light supplied.

Examining the company's construction expenses in this manner it becomes apparent that its profits have been enormous. Even paying 14 per cent. dividends it has been possible to retain large amounts as reserves, or to utilize them for machinery replacement. An electric company whose business, is more or less of a monopoly, can hardly be expected to make greater profits or to pay higher dividends than the Nagoya Dento K.K., in the period before its amalgamation with the Kansai Suiryoku Denki K.K.

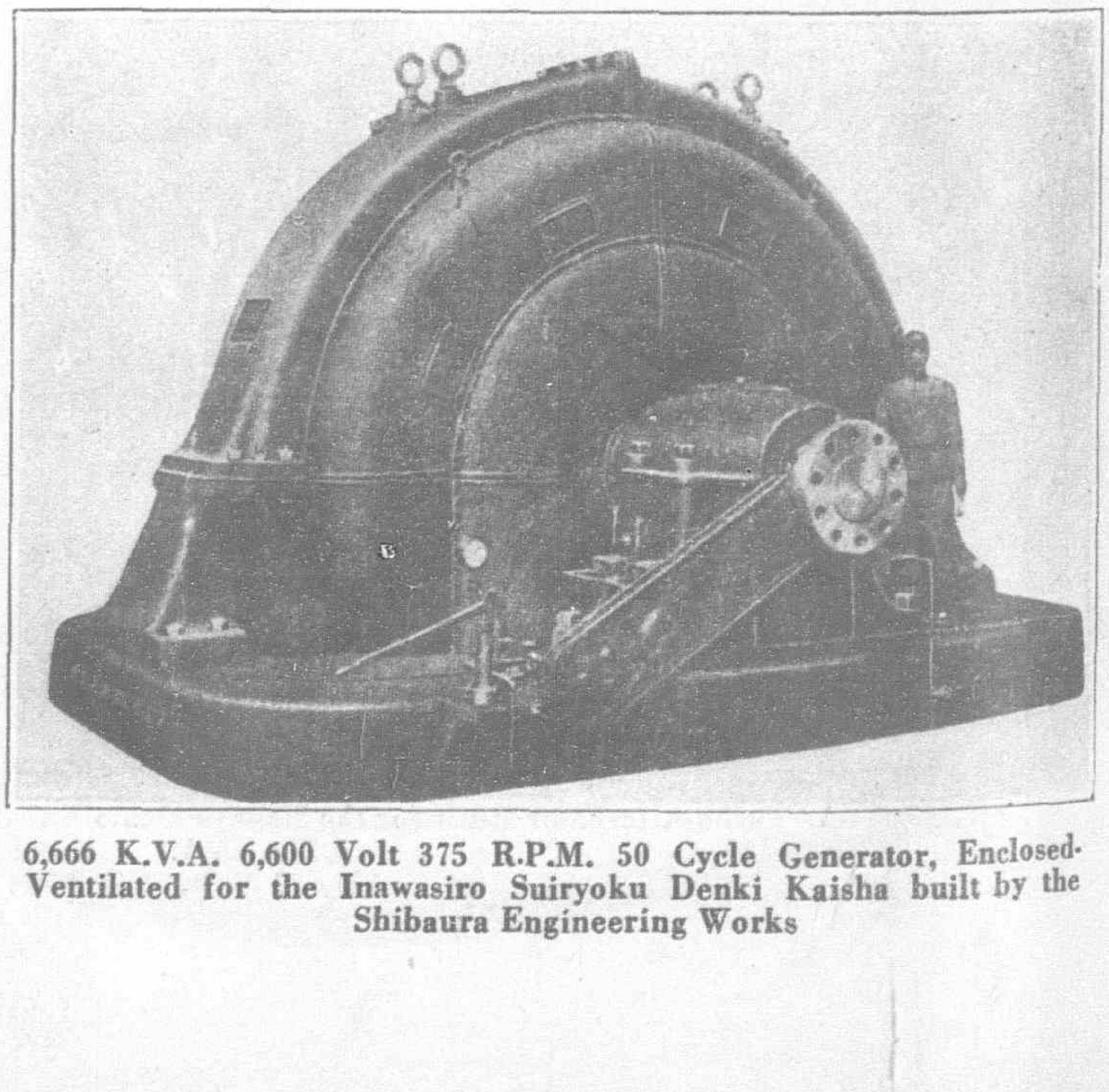
With such extremely high profit rates the company began to be bothered with complaints that its charges were too high and many attempts were made to obtain official action to lower the rates for light and power supply. In this condition of affairs, the Nagoya Dento began to look around for possible amalgamations which would cut down the percentage of its fixed capital compared to its paid up capital, to some such low point as in pre-war days. The amalgamation with the Kansai Denryoku K.K., was the result.

As a result of this amalgamation at the end of 1921, the fixed capital, or cost of construction, was cut to Y.688.00 per kilowatt, of water power, to Y.235.00 per kilowatt of coal power and the cost of one light was increased to Y.11.90. The purpose of the amalgamation, it can hardly be doubted, was to decrease the income-earning value of the Nagoya Dento. The pre-war figures of cost have evidently been taken as the standard, so the result of the depreciation can not be considered in too unfavorable a light.

The Kansai Denki K.K., plans to make many other amalgamations, which will be effected just as soon as the government's license can be obtained. Many of them were completed by the end of May, 1922. Some of the companies with which amalgamations



Three 1,875 K.V.A. 11,500 Volt 500 R.P.M. 50 Cycle Vertical Shaft Generators built by the Shibaura Engineering Works for the Wakayama Hydro-Electric Co.



6,666 K.V.A. 6,600 Volt 375 R.P.M. 50 Cycle Generator, Enclosed-Ventilated for the Inawasiro Suiryoku Denki Kaisha built by the Shibaura Engineering Works are to be effected are almost as important financially as the former Nagoya Dento K.K., the Kyushu Dento Tetsudo K.K., in especial, being one of these. It is natural then that the capital of the Kansai Denki will be increased.

It is reported that on amalgamation the Hokusei Denki K.K. will receive 13/3/10 shares of the Kansai Denki K.K., for each ten shares of its old issues. While the Yawata Suiryoku will receive two for one and the Bishu Denki 13 for 10.

On the basis of these amalgamations the fixed capital of the Kansai Denki at the end of May, 1922 ought to be :

Cost of construction, water power plants ..	Y.18,410,767
Cost of transmission lines	5,621,141
Total	Y24,031,908
Electric Light and Power Equipment :	
Transformer stations, construction expenses	4,567,068
Transmission lines and installations.. ..	32,983,640
Total	Y.37,950,708
Cost of construction, coal-burning plants ..	Y.12,412,194

Compared with the end of 1921, this is an increase of Y.33,260,000.

When the amalgamations are completed, the company's power plants will be :

Water power plants	37,678 kilowatts
Coal burning plants	46,850 ,,
Lights, converted into 10 candle power units	2,500,617 lights
Power sold	107,991 H.P.

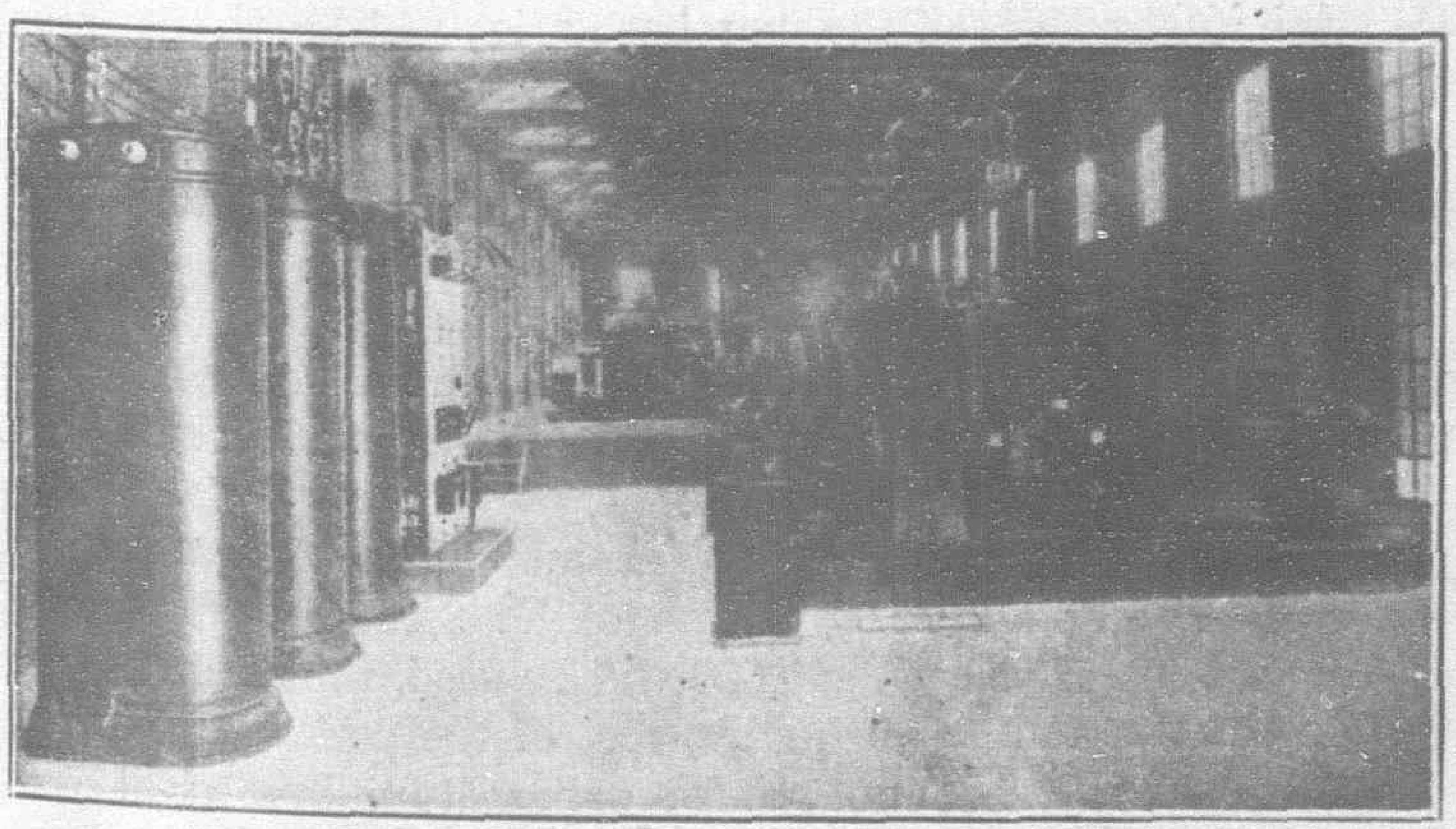
An increase in water power capacity of 16,200 kilowatts will be one of the results of the amalgamation, as the Kawakami River, Kyushu and several other large power plants will be added to its equipment. The capacity of the coal burning plants will be increased by the addition of plants at Maeda, Najima and Nagasaki.

The number of lights will be increased by about 50 per cent., reaching 2,500,000 in all ; while the power sold will increase 60 per cent. to 107,000 h.p.

Compared to the end of 1921, the cost per unit of power will be as follows :

	Dec. 31, 1921.	Dec. 31, 1922.	Increase or decrease
Water power, 1 kilo.	Y.688.30	Y.637.80	Dec. Y.50.50
Coal power, 1 kilo.	235.10	264.90	Inc. 29.80
Per 10 c.p. light ..	11.90	10.60	Dec. 1.30

The increased cost of the coal power units is due to the amalgamation with the Kyushu Dento Tetsudo K.K., with its coal burning plants at Najima and Nagasaki.



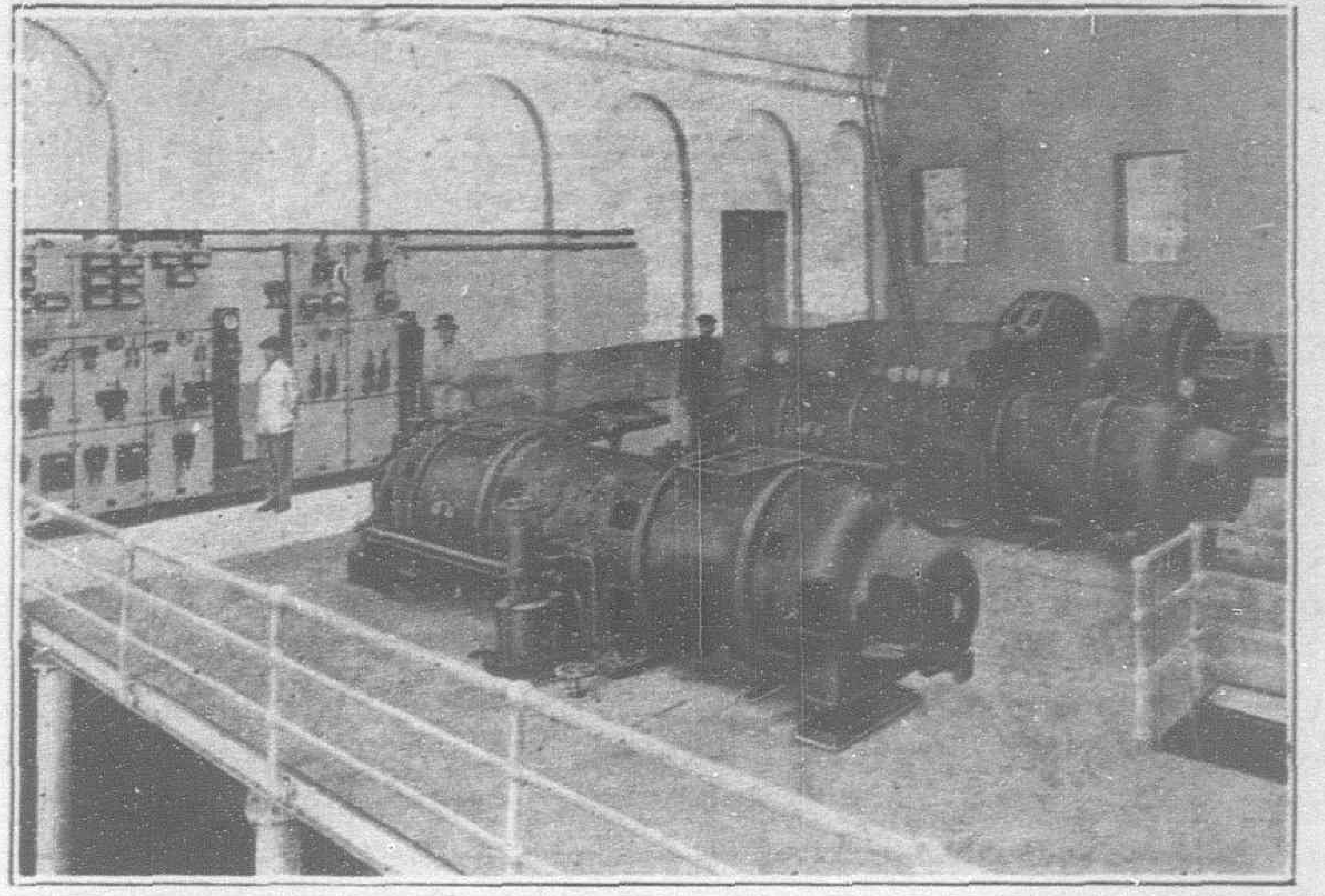
No. 1 Power House of the Kobe Mitsubishi Works

The Najima power plant is built in the outskirts of the city of Fukuoka. The site is larger than is at present necessary, but it is capable of expansion without great expense.

The installations of these newly amalgamated concerns were all war purchases, so they are relatively expensive. Consequently the cost per kilowatt for coal power plants has increased Y.30.00 by these recent amalgamations.

But the cost of light and water power units has been materially lowered, which proves that the Kansai is bettered by making these amalgamations.

After making the amalgamations with the Kyushu Dento Tetsudo, the Bishu Denki, the Yawata Suiryoku and the Hokusei Denki, the Nagoya Gas Co., will be absorbed. This will complete the planned amalgamations for the present.



No. 2 Power House of the Kobe Mitsubishi Works: Turbo-Generating Sets made by the Mitsubishi Works

At present the Kansai Denki K.K., holds some 524,000 shares of the Daido Denryoku K.K., amounting to Y.26,000,000 on which Y.12,000,000 has been paid up. It still is liable for Y.14,000,000 to be paid the Daido Debryoku. It is also liable for some Y.3,000,000 to be paid the Nohi Denki K.K. and the Gifu Kogyo K.K., in which it holds investments also. On its investments it receives about 8 per cent. a year.

Should the Kansai Denki resort to making calls on its unpaid capital in order to meet its obligations to others when they become due, it may be difficult to continue paying 13 per cent. dividends. It is, accordingly, said that company plans to issue debentures for the amount of its obligations to others, because debentures can easily be floated at 9 per cent., thus effecting a saving on earnings.

It may therefore be taken for granted that the Kansai Denki K.K., will continue its career of expansion without detriment to the profits it has been paying its shareholders.

Japan's Iron and Steel Production in 1921

According to a report of the imperial department of agriculture and commerce, the production of iron and steel in Japan during 1921 was considerably decreased, although on the whole the results of production were good. There are now signs of recovery in Manchuria and Chosen.

Production 1921.	Japan Proper	Chosen	Manchuria	Total
Pig iron	476,127 tons	83,010	93,951	653,088
Iron and steel alloys ..	7,574	—	—	7,574
Charcoal steel ..	764,551	51,016		816,167
High speed steels ..	20,444	—	—	20,444
Raw material for making charcoal steel ..	479,783	30,026	—	509,809
Forged steel	101,724	—	—	101,724
Others	68	—	—	68

Japanese Engineering Notes

Rail and Tramway Combines

THE Morioka Electric Industrial Co. and the Onsen Tramway Co. were amalgamated on May 1. The Ise Electric Railway Co., Tsu Electric Light Co. and the Matsuzaka Electric Co. were voluntarily dissolved on April 30, and on May 1 combined under the name of the Mie Amalgamated Electric Companies Ltd. On May 8, 1922, the Iyo Railway and Electric Co., the Ehime Hydro-Electric Co., the Kawakami Hydro-Electric Co. combined in order to finance the increased business of the Iyo Tetsudo Denki K.K. The capital of the new organization will be increased to Y. 16,500,000.

Official approval has been obtained for the amalgamation of the Yoro Tetsudo K.K. (Yoro Railway Co., Ltd.) with the Ihigawa Denki K.K. (Ihigawa Electric Co., Ltd.) and for an increase of capital to Y. 10,000,000. On May 15, 1922, the amalgamation of the Kyushu Dento Tetsudo K.K. (Kyushu Electric Light and Railway Co., Ltd.) with the Kansai Denki K.K. (Kansai Electric Co., Ltd.) was announced. The Kansai Denki will increase its capital to Y. 133,041,200 as a result of this and previous amalgamations with the Hokusei Denki K.K., the Aiki Denki Kogyo K.K. (Aiki Electric Industry Co., Ltd.), the Tokyo Suiryoku Denki K.K. the Yahata Suiryoku Denki K.K. and the Bishu Denki K.K. The Sunen Denki K.K. absorbed the Hagoromo Seihyo K.K. (Haoromo Ice Manufacturing Co., Ltd.) and the Abe Denki K.K. on May 26, 1922 and its capital increased to Y. 3,550,000.

The Hokkaido Seito K.K. (Hokkaido Beet Sugar Co., Ltd.) operates for its own use 2 miles and 22 chains of light railway between Obihiro Machi, Kawanishi Bu, Tokachi Hokkaido and Taisho Mura. The line is standard Japanese gauge 3 feet 6 inches. These lines were recently licensed to carry freight and passengers for the general public and are now under the operation of the local railways law. The cost of construction of this short line was Y. 149,702. The capital of the company is Y. 10,000,000.

The Keihan Denki Tetsudo K.K. (Kyoto-Osaka Electric Railway Co.) was originally licensed under the provisions of the tramway construction law. The line is electrically operated between Hamura, Honjo, Kita Ku, Osaka city and Omiya-machi, Shijo, Nishi Ku and Kyoto city, a distance of 27 miles and 20 chains. The gauge is 4 feet 8½ inches. The capital of the company is Y. 36,000,000 and the cost of construction is Y. 25,000,000. The company was recently obliged to change its license and become a local railway.

Capital Increases.—The Shiratana Tetsudo K.K., operating between Shirakawa-machi and Tanakura-machi, 14 miles, 51 chains, on November 30, 1921, applied for official sanction to increase its cost of construction to Y. 700,000. The approval was obtained in May.

The Akao Tetsudo K.K., operating between Shiohama and Aritoshi on April 30, 1922, has increased its cost of construction to Y. 750,000. The following companies have increased their capital; the Hokuso Tetsudo K.K., to Y. 1,500,000, the Hase Tetsudo K.K., to Y. 150,000, the Jinchu Tetsudo K.K., to Y. 700,000, the Chichibo Tetsudo K.K., to Y. 1,000,000 and the Osaka Tetsudo K.K., to Y. 3,000,000.

New Railway Lines

The following new railway lines were opened to business between April 1 and May 31, 1922:—

Gojome Tetsudo K.K., from Gojome to Goji, 2 miles, 31 chains; Chikuma Tetsudo K.K., from Hata to Shinmura, 3 miles; Sagami Tetsudo K.K., from Samukawa to Higashi Shinomiya, 1.2 miles; Osaka City Electric Railway Department, from Kobayashi-machi to Tsurumachi 4 chome, 1 mile, 6 chains; Ikoma City Electric Railway Co., Ltd., from Oji to Yamashita, ½ mile, from Yamashita to Shigiyama, 1.1 mile; Osaka City Electric Railway Department, from Shikajima-machi to Shimaya-machi, 1 mile, 53 chains; Tokyo City Electric Bureau, from Shibuya-machi to Nakashibuya, 6 chains; Chichibu Tetsudo K.K., Kagemori to Buko, ¼ mile, Kunigami to Arakawa ⅗ miles.

Water Power Sites.—According to a report of the department of communications there are 1,126 sites available for development of hydro-electric power in Japan. There are eight rivers yielding more than 100,000 h.p. each, with 68 sites with a potential power of more than 10,000 kilowatts. It was expected to complete details of the investigation before the end of March, 1923, but owing to lack of funds the survey has been suspended this year.

Tramway for Sendai and Toyohashi.—A survey for tramways is Sendai has been finished, and a company will soon be licensed to undertake construction. The city of Toyohashi, in Aichi prefecture, is also considering a street railway system to be operated by the municipality.

Electric Railway Merger.—The Nankai Tetsudo K.K. (Nankai Railway Co., Ltd.), the Osaka Koya Tetsudo K.K. (Osaka Koya Railway Co., Ltd.) and the Koya Daishi Tetsudo K.K. (Koya Daishi Railway Co., Ltd.), effected a merger with a capital investment of Y. 50,000,000. It now practically controls private railway transportation in the district south of Osaka and around Wakayama.

Kuhara Seeks Power Sites.—The Kuhara Kogyo K.K. (Kuhara Mining Co., Ltd.), a pioneer in the use of electric power for mining operations in Japan, has turned its attention to developing water power along with its mining projects and has recently secured power rights to more than 70,000 kilowatts. As soon as official licenses are obtained, these will be developed, and power houses erected. Two more sites, one to develope 20,000 kilowatts and the other 50,000 kilowatts, have been applied for.

Japanese Electric Lamps for Siberia.—The demand for electric bulbs is gradually increasing in Manchuria and Siberia. The Japanese bulbs are in demand in those territories where cheapness of price is more desired than quality. Japanese merchants are looking forward to increased sales in these territories and are taking steps to improve the quality of their products. About 1,000,000 bulbs a month are now shipped from Japan to these districts.

Osaka Municipality to Purchase Osaka Dento.—It is reported that the Osaka municipality is making preparations to purchase the business and equipment of the Osaka Electric Light Co., Ltd. The basis of the purchase price will be the company's cost of construction, plus a compensation to be determined. Since the plan to purchase was decided upon, the light company has greatly expanded its business, but the municipality is determined to make the purchase at any cost.

Harbor Construction in Japan.—The engineering bureau of the home department has allocated the funds voted at the last session of the diet for the improvement of the harbors at Takamatsu, Tsuruga and Sakai.

For the improvements at Takamatsu covering a period of five years beginning 1922, a sum of Y. 2,200,000 was granted. During this fiscal year Y. 415,000 will be used, the balance in more or less equal amounts during the rest of the period. At Tsuruga Y. 3,400,000 will be allotted for expenditure over eight years. During the present year Y. 110,000 will be used. From 1922 to 1927 a sum of Y. 1,800,000 will be spent at Sakai.

Cement Merger.—The Toyokuni Cement Co., Ltd., of Fukuoka city, with a capital of Y. 5,000,000; Y. 1,750,000 paid up, has been merged with the Nagoya Cement Co., Ltd., of Nagoya city, capital,

Y. 2,000,000; paid up, Y. 500,000 and the Saga Cement Co., Ltd., of Saga prefecture, capital, Y. 800,000, all paid up, the Nagoya Cement Co., called up a payment of Y. 10.00 per share on its outstanding unpaid capital and the Toyokuni took over both the other companies with all their debts and property as they stood on June 1, 1922. The capital of the Toyokuni Cement Co., Ltd., has accordingly been increased to Y. 7,500,000 and for the increase of Y. 2,500,000, fifty thousand shares of new stock have been issued. A bonus was paid to the employees and directors of the two merged companies.

Japan Electric Power Co.

The new 24,000 kw. Seto power plant of this company will be completed this year. This company now purchases 26,000 kilowatts from others. When the new plant is completed it will have 50,000 kilowatts of power to distribute in the Osaka district.

Ujigawa Electric Co.

On reclaimed harbor land owned by the municipality of Osaka, the Ujigawa Denki K.K., plans to erect a new coal-burning power plant, at the juncture of the Kitsugawa and the Kitsu river canal. The site, 16,000 *tsubo* (576,000 sq. ft.) is leased for thirty years at 12 sen per *tsubo* per year, with a slight rise in rental each five years.

Fuji Hydro-Electric Co.

The Fuji Hydro-Electric Co., Ltd. has issued Y. 3,000,000 of debentures through the Yasuda Ginko of which Y. 2,000,000 is to redeem outstanding indebtedness, and Y. 1,000,000 for installing 16 miles of transmission wires between Numadzu and Kozu and a new transformer station at Atsugi-machi, to supply light and power in that part of Kanagawa prefecture.

Kyushu Hydro-Electric Co.

On June 1, 1922, the last payment of capital amounting to Y. 12.50 a share, a total of Y. 4,900,000 was called up by the Kyushu Suiryoku Denki K.K., to redeem outstanding debts and debentures. The Mitsui interests will receive Y. 3,000,000 and debentures amounting to Y. 1,200,000 redeemed. This company now has under construction hydro-electric power plants at Oyama, Imahata and Chinda and a coal-burning plant at Fukuoka city. For these four plants Y. 4,500,000 to Y. 5,000,000 is needed. Another power plant not yet commenced requires another large sum. Before these plants can be completed, it will be necessary to double the existing capital at a proper opportunity. Present capital is Y. 37,400,000, all paid up.

Nankai Hydro-Electric Co.

The Nankai Hydro-Electric Power Co., Ltd. (address 1030 Hikata-machi, Kaiso-gun, Wakayama prefecture) has decided to increase its capital of Y. 1,000,000 to Y. 2,500,000 and to call up the first payment on August 1, 1922. This company owns the following power plants:

1. Kamimatsubara, Ishigaki Mura, Arita Gun, Wakayama Prefecture, on the Arita River. This plant is now under construction to generate 350 kilowatts, with a high-tension voltage of 11,500.
2. Surigawa, Ishigaki-mura, Arita-gun, Wakayama prefecture, on the Arita River. The 200 kilowatt power generated by this plant is used for a reserve supply. High-tension voltage of 3,450.
3. Coal-burning plant. Nadaka, Uchimi-mura, Kaiso-gun, Wakayama prefecture. This 300 kilowatt plant is now under construction and its power will be used for reserve. High-tension voltage of 3,450.
4. Kawaguchi, Iwakura-mura, Arita-gun, Wakayama prefecture, on the Arita River. This 500 kilowatt plant is now under construction, 3,450 volt.
5. Numa, Yahata-mura, Arita-gun, Wakayama prefecture, on the Arita River, also under construction to produce 1,450 kilowatts.
6. Uses power purchased from the Wakayama Suiryoku Denki K.K., 575 kilowatts.
7. Uses power purchased from the Hitakagawa Suiryoku Denki K.K., 250 kilowatts.

The total power generated and purchased is 825 kilowatts; under construction, 2,300 kilowatts; reserve, 200 kilowatts and under construction, 300 kilowatts. Besides these power plants operating and under construction this company owns four transformer stations. The Nankai Suiryoku Denki K.K. was established in June, 1904 and began business in 1910. It supplies light and power in Kaiso-gun, Naka-gun, Arita-gun and Kaiso-gun in Wakayama prefecture, to four towns and 27 villages and the power for the Nogami light railway company.

The officers are: President: Ichirobei Kamiyama; Managing Director: Shichiroeimon Gozen; Directors: K. Gozen and Z. Morita; Chief Engineer: N. Fujii.

Electrical Companies Combine

The Tsu Dento K.K. (Tsu Electric Light Co., Ltd.), capital, Y. 2,000,000; paid up, Y. 1,500,000; the Matsuzaka Suiryoku Denki K.K. (Matsuzaka Hydro-Electric Power Co., Ltd.), capital, Y. 2,000,000; paid up, Y. 1,025,000 and the Ise Denki Tetsudo K.K. (Ise Electric Railway Co., Ltd.), capital, Y. 4,000,000; paid up, Y. 2,050,000, have received permission to amalgamate.

The capital of the new company will be Y. 12,500,000. The Tsu Dento K.K. owns one hydro-electric power plant and three coal-burning plants, producing a total of 940 kilowatts. It has under construction, one hydro-electric and one gas-burning power plant to generate 448 kilowatts.

The Matsuzaka Suiryoku Denki K.K. owns and operates one hydro-electric, one coal burning and two gas-power plants, generating 875 kilowatts. It also has under construction one hydro-electric power plant to generate 700 kilowatts.

The Ise Denki Tetsudo K.K. owns one coal-burning and one gas-power plant, generating 485 kilowatts. It also has under construction one hydro-electric plant to generate 832 kilowatts and another projected plant to utilize 1,000 kilowatts, which it planned to purchase from the Mie Kyodo Denryoku. The power for this plant will, however, now be supplied by other members of the new amalgamation.

Tokushima Hydro-Electric Co.

At the end of 1921 the Tokushima Suiryoku Denki K.K. (Tokushima Hydro-Electric Electric Power Co., Ltd.) has annexed three small companies, the Fukura Dento K.K. (Fukura Electric Light Co., Ltd.), the Yura Dento K.K., (Yura Electric Light Co., Ltd.) and the Awaji Denki K.K. (Awaji Electric Co., Ltd.)

It recently absorbed the Sotanigawa Suiryoku K.K., capitalized at Y.4,000,000. The capital of the Tokushima Suiden Y.7,250,000, will be increased to Y. 12,000,000. The Tokushima Suiden owns two hydro-electric power plants generating 1,800 kilowatts and one under construction to generate 730 kilowatts; two coal-burning plants, for reserve power, now generating 950 kilowatts. It also purchases from the Fukushima Boseki K.K., 500 kilowatts; a total actual generating output of 2,300 kilowatts, with 730 under construction. The Sotanigawa Suiryoku Denki K.K. owns four hydro-electric power plants in operation, generating 2,766 kilowatts.

SAKUSAWA ELECTRIC RAILWAY.—A new electric railway between Tanaka station on the Shinyetsu line of the Imperial Government Railways, and Kayano station of the Chuo line of the Imperial Government Railways, a distance of 35 miles, will be built by a new company, called Sakusuwa Denki Tetsudo K.K. (Sakusuwa Electric Railway Co., Ltd.), capitalized at Y. 500,000. The first call of Y.50,000, one-tenth of the total, has already been paid in.

This line passes through a district of summer resorts and hot springs rich in natural products. The Imperial Government Railways will bring large numbers of passengers to its terminals, ensuring the prosperity of the line.

South Osaka Electric Railway

The imperial government department of railways has granted permission to the South Osaka Electric Railway Co., Ltd. to begin construction of the first part of its line between Sakai city and Takada in Yamato province, nineteen miles and some chains. Work will be begun in the very near future.

Tsukushi Electric Railway

The Tsukushi Electric Railway Co., Ltd., operating between Kurume and Fukuoka, in Fukuoka prefecture, Kyushu, a distance of 24 miles, double track, gauge 4 feet 8½ inches, has decided to use the latest type of high-speed tram car. These cars will carry 80 passengers and travel at a speed of 50 miles and hour, which is faster than any steam line in this country. The distance between Kurume and Fukuoka, with stops, will be covered in 50 minutes.

Electrification of Yoro Railway

The Yoro Tetsudo K.K., which operated 35.8 miles of steam railway (gauge 3 feet 6 inches, weight of rails 45-lbs.), between Ihi and Kuwana in Gifu prefecture, amalgamated with the Ihi River Electric Co., Ltd. on June 1, 1922. The Yoro Tetsudo K.K. was capitalized at Y. 5,000,000 and the cost of its lines to March 31, 1922, was Y. 3,200,000. The Ihigawa Denki K.K. owns two hydro-electric power plants in operation, generating 11,900 kilowatts and has under construction another hydro-electric plant to generate 3,000 kilowatts. It also has a coal-burning plant held in reserve with 1,250 kilowatts. It was capitalized at Y. 10,000,000; paid up, Y. 6,250,000, and loans outstanding, June 30, 1921, of Y.6,893,381. Its address is Shintomi Cho, Kyobashi Ku, Tokyo.

In effecting the amalgamation, the capital of the Ihigawa was paid up to the amount of Y. 8,000,000 and the Y. 4,000,000, of the Yoro Tetsudo added to it to make the capitalization of Y. 12,000,000. The total capital, now paid up, is Y.10,000,000. The new company will complete the construction of the Hirosegawa power plant of the Ihigawa Co., and the steam line of the Yoro Tetsudo will be electrified. In addition, the projected railway line between Kuwana and Yokkaichi will be completed and electrified. To carry out these plans the capital of the amalgamation will be increased to Y. 20,000,000 during this year.

Ikoma Electric Railway

The Ikoma Electric Railway Co., Ltd., has completed the first section of its line between Oji and Shinkizan, 1 mile, 5 chains. The second section between Shinkizan and Ikoma will be completed in 1924. The first section is a mountain line, operated by cable. The section still unbuilt is on a level bed and will be operated by electricity.

Nankai Railway

The Nankai Tetsudo K.K. (Nankai Railway Co., Ltd.) will construct a double track along a large part of its line south of Koshizan, between Osaka and Wakayama. In order to obtain funds for this construction, the present capitalization will be increased to Y. 44,000,000.

Mitsui Electric Railway

The Mitsui Denki Tetsudo K.K. (Mitsui Electric Railway Co., Ltd.) operates 20 miles of electric railway between Amaki-machi, Asakura-gun, and Fukushima-machi, Yame-gun, in Fukuoka prefecture, passing through Kurume city. It also supplies light and power in the zone of the railway. Its capital is Y. 2,000,000; paid up, Y. 1,250,000. The line will shortly be extended from Amaki to Iidamachi, Tagawa-gun, Fukuoka prefecture, 3 miles, and a branch line constructed from Okuma-machi to Iizuka-machi, Kaho-gun, 7 miles. The line is 4 feet 8½ inch gauge. The company owns 16 cars. It obtains its power from the Kyushu Dento Tetsudo K.K. and the Kyushu Suiryoku Denki K.K., 350 kilowatts in all.

New Electric Companies

1. Yamatake Dento K.K. (Yamatake Electric Light Co., Ltd.), Main Office, Minami Kinroku Cho, 4, Kyobashi Ku, Tokyo.

Object: (1) To supply light and power. Buy and sell electric machinery, etc.; (2) to invest in other companies of like business.

Established: April 26, 1922. Capital. Y. 500,000, one-fourth paid up.

Officers: Representative Director: Yasukata Sonoda; Directors: M. Nakamura and T. Kase; Auditor: N. Akiba.

2. Kimoe Denryoku K.K. (Kimoe Electric Power Co., Ltd.)

Main Office: 620, Shiogama, Mizukawa-machi, Izawa-gun, Iwate prefecture.

Objects of Business: To supply light and power and to invest in companies of similar business. Manufacturing graphite.

Established: November 8, 1921. Capital: Y. 750,000, all paid up.

Officers: Directors: K. Ono, A. Oyobigawa, H. Yuzugi, Y. Eda, Y. Tsujiyama, S. Kobayashi, J. Goto, Y. Aoki and C. Sasaki. Auditors: K. Hanayama, J. Ogita, F. Yoshida and J. Soyeda. (All Iwate prefecture capitalists)

Change of Name: The Aikawa Denki K.K. (Aikawa Electric Co., Ltd.) of Kanagawa prefecture, changed its name to Sobu Denryoku K.K. (Sobu Electric Power Co., Ltd.), on March 16, 1922.

Furukawa Opens New Cable Factory

The Furukawa Denki Kogyo K.K. of Tokyo has recently erected a factory in Yokohama for the manufacture of marine cable. The factory consists of three mills, of which, the first is devoted to the manufacture of insulated and non-insulated electric wire and lead tubes. The second mill will produce enameled cable and wire for high-tension lines and also telephone cord. The third mill will produce paper insulated telephone and telegraph cord and paper insulated motor wire. The annual production of all three mills is estimated at a value of Y. 17,000,000. Annual capacity is Y. 30,000,000 worth of cable, cord and tube. An order has already been received from the Chinese government for 535 nautical knots of marine cable, to be used in the Chefoo-Shanghai cable. With the opening of this factory, it is believed, that an end will soon be put to Japan's imports of marine cable and high-tension wires and a balance of exports be shown within a few years.

Electric Heater Factory Planned

A new company to manufacture electric heaters, named the Nihon Dennetsu Kogyo K.K. (The Japan Electric Heat Industrial Co.), is planned by the Osaka Dento K.K., which will hold 10,000 shares, the Daido Denryoku K.K., with 5,000 shares, the Kansai Denki K.K., with 5,000 shares, the Kyoto Dento K.K., with 3,000 shares and the officers of the Osaka Dento K.K., with 5,000 shares. The total capital will be Y. 2,000,000; paid up, Y. 500,000. Twelve thousand of the forty thousand shares will be offered to the public. Many of the directors and shareholders of the Hanshin Dentetsu K.K. have expressed their desire to subscribe for these shares. This company will purchase the Ukita Dennetsu K.K., for Y. 125,000 and the ground used for exhibition of its electric machinery by the Osaka Dento K.K. By agreement with the Ujigawa Denki K.K., this company is also now planning to establish the Kawakita Denki K.K. (Kawakita Electric Machinery Co., Ltd.), with a capital of Y. 200,000.

HYDRO-ELECTRIC POWER SURVEY ABANDONED.—The hydro-electric power survey which has been carried on by the department of communications since 1918, will have to be abandoned during the fiscal year 1922-1923, because of lack of funds. Surveyors in the field are all recalled from the end of June, 1922.

It is hoped that the work may be continued after this year, until completed. The completion will take three or four years, at an expense of Y. 300,000 a year.

Osaka Arsenal to be Electrified

The government arsenal at Osaka is using a few electric motors, but it still possesses three dozen chimneys which belch forth smoke in the east of the city much to the distress of the people living near it. The electric motors in use have been so satisfactory that the chief of the arsenal staff, Colonel Kurosaki, is desirous of replacing all the coal-burning furnaces with electric machinery. Power is now purchased from the Ujigawa Denki K.K. and this company would be drawn on for the increase of power required by a complete electrification. No funds are now available for the change, but it is believed that this improvement can be managed from the working funds of the institution. At least the workshop can be completely equipped with electric power, in response to a demand on the part of the workmen for more modern working conditions.

Giant Radio Company for Japan

A wireless company capitalized at Y. 200,000,000 which will greatly facilitate communications between Japan and America, will soon be established in Japan, if the plans as formulated by the Nippon Yusen Kaisha, the Osaka Shosen Kaisha, the Industrial Bank, Suzuki & Co., Takata & Co., Mitsui & Co., Okura & Co., Fujita & Co., Viscount Shibusawa and other leading financiers of Japan receive the support of the government and are brought to a completion.

The plans have been laid before Premier Kato and received his private sanction. They will later be taken up formally and from present indications will be approved.

The proposed company desires to form a company which will favorably compare with the Marconi Company of Great Britain, the Radio Corporation of America and the Telegraph Company of France. It will concern itself primarily with improving communications across the Pacific. The promoters state that as soon as the government has approved their plans, they will make a formal statement regarding the proposed action. Several expert engineers of Japan have signified their willingness to aid in establishing the company, according to recent reports.

Electric Tube for Kobe

Kobe plans to build an underground electric railway, which will traverse the city lengthwise. Tentative consent to the plans has been obtained from the city's council and an appropriation of Y. 260,000 as expenses of investigation is shortly to be asked for.

The plan informally presented at a meeting of the council on July 20 and tentatively agreed, provides that an underground electric railway be built, starting from the city's eastern boundary, paralled with the present surface steam railway, turning at the Aioi bridge to Naka-machi, through the Hyogo railway station, and under the 8 *ken* road of Nishi Shinkaichi reaching to the Sakai river on the city's boundary on the west. The entire length is to be about 4.88 miles. The proposed underground railway is to run under the future national road. The trains are to be high-speed ones.

In future, the line is to be extended to Osaka in the east and Akashi in the west.

An amount of Y. 260,000 shortly to be asked for is to be used in three years of investigation, from 1922-3 to 1924-5, so that the work of investigation may be commenced at once.

English Electric Locomotives for Japan

THE Imperial Government Railways of Japan have just placed with the English Electric Company for their Dick Keer Works at Preston an order for 34 complete electric locomotives of the total value of upwards of £500,000. This represents the whole requirement of locomotives up to the end of 1923 for those sections of their main line railways which the Japanese government have decided to electrify at once. The order was obtained in the face of keen foreign competition, particularly from America, and was placed with the English Electric Company, after the fullest investigation by Japanese engineers into the systems in operation in different parts of the world owing to their confidence in the excellence of British design and workmanship.

Eight of the locomotives now ordered are for heavy express passenger service. They are of the 2-C-C-2 type. Their weight is approximately 96 tons and they are designed to haul a 415-ton train at a balancing speed of about 60 miles per hour. Each locomotive is equipped with 6 D.K. 86A. Motors rated at 306 h.p. at 500 volts, the motors being connected in two groups of three in permanent series on a trolley voltage of 1,500 volts. The control equipment is the standard " English Electric " cam-shaft multiple unit type.

Of the remaining locomotives, nine are for local passenger service and 17 are for heavy freight service. These 26 are all of the B-B. type and will weigh approximately 56 tons each. They are equipped with 4 D.K. 86A. Motors similar to those on the express passenger locomotives, but in this case the motors will be connected in two pairs in permanent series. Here too the control is the standard " English Electric " multiple unit type. The locomotives for local passenger service are designed to haul a 315-ton train and the freight locomotive a 600-ton train, the balancing speeds being about 55 and 40 miles per hour respectively.

Japanese Dockyard to Build Electric Locos

The plan of electrifying the Tokaido railway line recently made public by the government seems to have given a sensation to all Japanese dockyard companies. Since the fatal blow was dealt on the dockyard business which was in utmost distress, by the naval limitation, they have been doing anything such as repairing and casting, manufacturing the bridges, locomotives, oil tanks, or electric cars. All of them are now reported to be pinning their hope in the materializing of the plan, in order to get the order for electric locomotives and cars. Above all, the Kawasaki Dockyard Company has already dispatched an engineer to the United States to study construction, and a part of the works is in course of reconstruction for the purpose. The estimated expenditures on the electric locomotives being only Yen 35,000,000 their obtaining enough orders to revive the depressed business is generally doubted.

Alumina from Clay

The discovery of a method of producing alumina, the original material for manufacturing aluminium, from clay has been made by Mr. Hiroshi Tanaka, attached to the department of agriculture and commerce.

During the great war, when the supply of alumina from America practically ceased, scientists in Germany made great endeavors to discover a method of production, but of no avail. Alumina has hitherto been produced from a mineral in America by means of electrification, and the majority of the world's demand has been supplied from the United States.

Aluminium is now in great request for use in various capacities, and should the aforementioned discovery be practicable, its contribution to the industrial world will be a great one.

Osaka Electric to Install New Equipment

The Osaka Electric Company was ordered by the government communication bureau in Osaka, under date of July 17, to repair completely its electric equipment, up to January 16, 1923. The government bureau after a thorough investigation conducted in the plants of the company found that among 25 other defects, the insulated copper wires were insufficient to cope with the power transmitted, and decided to issue the order. Instructions to the effect that such an order was issued were received by the public safety section of Osaka prefecture on July 23.

The Far Eastern Review

A Monthly Review of Far Eastern Trade, Finance and Engineering, Dedicated to the Industrial Development and advancement of Trade in Far Eastern Countries

ENGINEERING FINANCE COMMERCE

5 JINKEE ROAD, SHANGHAI, CHINA

Telegraphic Address: Farview, Shanghai

SHANGHAI, AUGUST, 1922.

Kato

ADMIRAL Baron Kato has succeeded to the position and policies of Hara and Takahashi. A fighting man, he is an advocate of peace; a militarist, he is opposed to an aggressive foreign policy and the control of the government by his own group. He insists upon restoration of friendly relations with China and has placed into effect policies calculated to bring this about. Kato intends to keep the pledges he made in the name of Japan at Washington.

Admiral Baron Tomosaburo Kato, the New Premier of Japan
(The New York Times)

Kato, the man with the ideal poker face, won the hearts and esteem of the American newspapermen. He is now living up to his promises, making good his words by deeds. The American press is with him. With hardly a dissenting voice, the editors of America are acclaiming Kato as the safest and best bet for those who hope to see the resolutions of the Washington conference carried into effect. The new premier of Japan has made a great hit with America; a tremendous asset for Japan in world affairs.

Kato accepted his new task on the explicit understanding that the army budget should be reduced by Y.40,000,000 and a policy of retrenchment adopted all along the line. The garrisons at Hankow and Tsingtao and the Shantung railway guards and troops in North China have been recalled. Siberia is to be evacuated. Japan is placing into practice the resolutions arrived at in Washington, getting down to brass tacks, by retaining only such guards in China as are necessary to guarantee protection to the South Manchuria Railway.

The accusations that Japan was deliberately building auxiliary ships to neutralize the 5-3 ratio has been refuted by the official announcement that her naval building program calls for four new cruisers of 10,000 tons and five of 7,000 tons, besides 24 destroyers with an aggregate of 33,000 tons and twenty-seven submarines with an aggregate of 28,116 tons. Port Arthur is to be abandoned as a naval base and 12,000 line and non-commissioned officers are to be dropped from the Japanese naval lists. The Washington treaties have been ratified.

Militarism in Japan is becoming more and more unpopular. It is true that the military leaders are still powerful but the time is not long distant when the rising tide of liberalism will sweep them into their proper place. A change has come over the viewpoint of the young men of Japan. They avoid the army, evading military service by every subterfuge to seek their careers in the professions, in commerce and the government service. Military men as husbands are a drug on the matrimonial market. Relieved of the strain of maintaining a huge army and navy for defensive purposes, Japan is living up to the declaration of Kato at Washington. "The Japanese," he said "had never in view preparation for offensive war."

Kato has become the outspoken advocate of international understanding and of concession to world opinion. He sees no profit in any course other than a sincere endeavor to retain the confidence of the rest of the world. Japan's foreign policy laid down by Hara adhered to by Takahashi, and from which Kato will not depart, is to co-operate with the powers in the spirit as well as the letter of the covenent of the league of nations and the treaties and resolutions signed at Washington, with the view that concord and friendship may continue and develop among the nations and that reduction of armaments may steadily progress to relieve the difficulties and burdens of mankind.

Kato, the grim chief of staff of the Kamimura squadron of Togo's fleet who laid his vessels across the bows of the advancing Russian battleships at Tsushima and destroyed them ship by ship, Kato, the expert responsible for Japan's naval expansion program that placed his country among the ranking sea powers, in order to demonstrate his good faith in America gladly signed and is carrying out the provisions of a treaty which relegates his past work to the junk pile. Kato could do this, as the navy he had built was designed to defend the island empire against a possible attack by the fleets of the United States. Once satisfied that America had no aggressive designs in the Pacific, Japan had no use for a big navy and Kato could gladly accept the 5-3 ratio.

With distrust turned into confidence and understanding, the road to co-operation between Japan and America is wide open. Japan is losing no time in getting into step with the United States, the greatest insurance policy she can take out that never again will she be called upon to burden her people with the enormous taxation required to maintain a huge navy. The Japanese of the future will be able to look back with grateful remembrance to the men who rehabilitated Japan's good name at a time when such rehabilitation was a vital national necessity.

The names of Takashi Hara and Tomasaburo Kato will live in history as the men who placed Japan in the ranks of the liberal nations of the world, when the inside story of the struggle between militarism and liberalism in that country is written other names will be added to Japan's roll of honor.

For behind the premiers, cabinet officers, statesmen and diplomats of Japan stands a party of broad-minded financiers, merchant princes and captains of industry forming part of the Japanese group in the consortium, who have laid down the program their statesmen are now adhering to. It is fortunate for Japan, for America, for China and the peace of the world, that this group has men like Kato on their side. The outburst of sincere good-will from America on receipt of the news of Kato's elevation to the premiership of Japan, is a tribute not only to the gallant admiral, but to the group who, with implicit faith in the *bona-fides* and common-sense of the American people, staked their reputations two years ago on the outcome of a campaign for co-operation that led to the Washington conference.

* * *

The Vindication of Lobinger

AMERICANS will be glad that the charges preferred against the American court for China have been dismissed after careful investigation by the department of justice and that Judge Charles S. Lobinger is back again on the bench prepared to sit in judgement on the two hundred and some odd cases which have piled up during his absence. Owing to the existence of a suit pending in the American court for China against this publication, it has been difficult for us to express any opinion on the merits of this case. Although we repose the utmost confidence in the judicial honor and integrity of Judge Lobinger, we incline to the opinion that the time has arrived when some modification of the law that will give Americans a trial by jury is essential to the dispensation of American justice in China. THE FAR EASTERN REVIEW was one of the first to urge the creation of the American court for China and recognized that the exceptional conditions prevailing in Shanghai twelve years ago, called for arbitrary powers on the part of the judge in order to clean up the undesirable element in the settlement. Conditions are now different. Many American firms with vested interests have established themselves in China. The undesirables have gone, and there is no longer any excuse for the continuation of a system that deprives Americans of their constitutional right to a trial by jury. Up to the present, Americans have been most fortunate in the judges appointed by the president to preside over the court in China. We may not always be so fortunate. It is no reflection on the judicial capacity of Judge Lobinger for Americans to plead for the institution of a system that would have relieved him of the unpleasant experiences of the past year.

The outcome of the investigations into the charges preferred against the judge is shown in the following executive order, issued by President Harding on June 23, entitled "Executive Order Dismissing the Charges Preferred by W. E. Fleming Against the Judge of the United States Court for China." It reads:

"A full investigation of the charges preferred by W. S. Fleming against the Judge of the United States court for China having been made, these charges are determined to be unfounded, and are therefore, dismissed.

"The judge of the court is hereby directed to return to his post of official duty at the earliest practicable moment.

"(Signed) WARREN G. HARDING."

This executive order was accompanied by the following personal letter from President Harding to Judge Lobingier:—

"THE WHITE HOUSE,
"June 23, 1922.

"MY DEAR JUDGE LOBINGIER,—I am enclosing herewith a copy of the executive order which disposes of the charges preferred against you as judge of the United States court for China. The record of the conclusion is filed with the department of justice. I trust you will make the earliest possible arrangements for your return to your post of duty and resume the sessions of the court. I should not be satisfied in sending you this notice if I did not say that in investigating the matter I have invited the fullest co-operation of the department of justice, and the decision is in accord with the views of that department, as I think to be becoming in view of its participation in the investigation.

"I wish for you a safe return, and a record of progress in the courts which will cure as far as possible the delay incident to the filing of charges and the inevitable delay in reaching the decision which the enclosed order conveys.

"Very truly yours,
"(Signed) WARREN G. HARDING."

The complete vindication of Judge Lobinger will stand as one of the highest testimonials to the integrity of the American bench. Americans have reason to feel a just pride in the dismissal of charges, which, if proven, would have lowered the national prestige in the eyes of other nationals in China.

* * *

Educate Chinese in China

THE campaign launched in London last year for the remission of the boxer indemnity still due to Great Britain, along lines laid down by the United States, raises the question of whether Chinese should continue to be educated abroad or trained in home colleges amidst surroundings and influences that will make them better able to cope with the problems of their own country. The argument that each student educated in Great Britain was not merely a consumer of British goods but also a rallying centre for them was used with great effect. In fact, the campaign was based solely on its beneficial effect upon British trade, a very potent argument at any time.

There was a time when such a premise had considerable force. That day is gone. Experience has demonstrated that on return to China, the graduate of foreign colleges drifts into official life where purchases of materials are governed by laws which he is powerless to modify. His preference for the materials of any one nation cuts little figure in the placing of the final order. In private life or business, the same rule holds good in another way. Squeeze or commission gives place to price and terms, and the nation that can meet the Chinese idea of what these ought to be, will get the order. The education of Chinese in American colleges has not created a preference for American materials.

The one benefit that would accrue to Great Britain from the education of perhaps two hundred students a year in British colleges, would seem to be political, counterbalancing the influence of American trained officials with their intense republican tendencies. The control of China's future development will be determined largely by whether the American educated official with his democratic leaning or the more conservative type educated in England is to come out on top.

The hope of establishing a stable constitutional government in China based on provincial autonomy with an elective president and parliament, can be attained only after years of domestic strife. The possibility of creating a constitutional monarchy, even with all the safeguards requisite for the protection of the liberties of the people will be opposed by the radical republican element. It is natural that the moral support and sympathy of Americans thould go out to those who accept their ideals, and it is just as natural that those who adhere to the constitutional monarchical theory of government should similarly encourage those Chinese who adhere to their views.

Neither of these systems have anything to commend them. Both are wrong, both difficult of application to China. The Chinese should be educated at home in his own environment. He should be taught to become a better Chinese citizen, fitted to cope with the peculiar problems of his own country and the needs of his people. A successful republic must come from below, from the education of the masses. The education of thousands of young Chinese in American colleges has simply turned loose a group of advanced political thinkers whose ideas can only be grasped and placed in practice when the millions of China are educated to an understanding of the fundamentals of democracy. Turn loose in China another 2,000 or more graduates of British colleges and domestic politics will continue at boiling point for years to come.

The American-educated Chinese has contributed nothing towards creating a market for American goods in China. It will be the same with those who may be educated in British universities. Loan agreements and clauses in financial contracts will decide the origin of materials on all government contracts, and terms and price will control the placing of private commercial orders. If the consortium functions in the financing of Chinese railways, orders for materials will probably go to the lowest bidder. In other words, it is a mistaken idea that a foreign education will serve as a wedge for the introduction of materials manufactured by the nation educating the Chinese.

It would seem more to the point if China is to be permitted to forego the payment of the boxer indemnities in return for sending a certain number of scholars to the various universities of England, France, Japan, etc., that she should be required to put her own educational system on a sound basis, and the remitted funds employed to endow and create new schools in China. There is no good reason why the charitable people of America and Great Britain should continue to support colleges and schools in China from missionary funds while this huge indemnity is employed to send students abroad. There are already a number of educational institutions in China dependent for their sole support upon foreign missionary and endowment funds which should be more liberally supported.

Now is a good time to change the system. If the boxer indemnities are discontinued, China should give some promise that the funds so released will be utilized for educational purposes at home, and the indemnity apportioned out to worthy and needy foreign-directed colleges carrying the load of educating the Chinese youth to become better citizen, China should also be required to set aside an equal amount for preparatory schools under the direction of the ministry of education. The remission of the boxer indemnities without such guarantees, simply means so many more millions for politicians and militarists to divert to their own uses.

Are the British desirous of educating the Chinese to become purchasers of British-made machinery and tools? There is the Hongkong University, with an engineering school equal to any at home and large shipyards and industrial plants in the colony where the graduate can obtain practical experience in the use of British specialties. There is the Canton University for Americans who wish to have their ideas inculcated in the young Chinese mind. There are numerous other institutions doing a noble work preparing the Chinese for a life work of usefulness in their own country. These schools have the first claim on the beneficence of foreign governments who may desire to forego their share of the boxer indemnity. Educate Chinese in China.

* * *

The "Amende Honorable"

TWO years ago, the American secretary of commerce directed a formal letter to Admiral Benson, head of the United States shipping board, in which he accused the Japanese of tampering with, damaging and intentionally delaying American cargo consigned to the Orient in Japanese bottoms. These charges constituted a public and official denouncement of the port of Kobe and were based on the mass of reports emanating from American concerns who saw in each delay, each broken crate, each pilfered box, evidence of a set determination on the part of the Japanese government and ship-owners to ruin their trade with China.

Conditions have changed. Investigations have brought out the truth and while not entirely exonerating the Japanese from the charges of carelessness in the handling, storage and safe-keeping of cargo, the facts fully vindicate the Japanese government and steamship companies of any conspiracy or intent to willfully discriminate against or injure American cargoes entrusted to their ships for ocean transport. The new American administration has since had time to digest all the facts in the case, and compare the reports from the Far East with those from other parts of the world.

In a speech made to American business men in Yokohama, Secretary Denby referred to "the constant annoyances and impediments that ensue when our goods are carried under the flags of other nations." "Instances have been known" he added, "of the deliberate rough handling of American freight to prejudice foreign markets against it." This he characterized as "commercial treachery" and as designed to cripple the trade of a rival country. "*No such instances, I am happy to say, have I ever heard of in connection with the Japanese merchant marine.*"

There has been so much propaganda emanating in the Far East directed against Japanese shipping methods, that this official vindication was construed as an indirect indictment of the only other maritime power carrying American cargo across the Pacific. Without waiting for an explanation, British newspapers in China hastened to condemn the speech as a reflection on British shipping. The British chamber of commerce in Shanghai went so far as to direct a letter to the American chamber of commerce requesting an explanation.

As all these matters hark back to war days and at a time when American commerce was dependent upon foreign shipping, no good object can be served by reviving the stories of discrimination against American trade which deluged the department of commerce from all parts of the world. It is, or should be, a dead issue. The history of those days makes unpleasant reading for all trading nations.

The simple statement of Secretary Denby should be welcomed as a tactful withdrawal of the charges preferred against Japanese shipping and not as an accusation against other nations. Secretary Denby lived up to the purpose of his special mission to the Far East by making the *amende honorable* for the public indictment of Japan by a former American cabinet officer. There has been no propaganda in this part of the world against British shipping methods.

To assume that exoneration of Japan implies an indictment of Great Britain, and that an American cabinet officer should be called upon to explain his statement for the satisfaction of other national interests, would seem to create a precedent that can only lead to regrettable misunderstandings. American trade encountered many difficulties previous to the entrance of the United States into the war.

The average American was extremely good-natured about these interferences with their legitimate trading rights. Even after America had entered the war her trade was largely at the mercy of those nations which had the ships to spare. Americans didn't complain very much about the manner in which their shipments were handled, but took to heart the lesson that was drummed into them. They built their own merchant marine, and with it a navy of sufficient strength that would assure for the flag the respect that had been denied to it in the earlier stages of the great war. They intend to maintain that merchant marine, even if they go broke in so doing. American friendship with Great Britain stood the test. The account is closed. Secretary Denby closed the account with Japan in his speech at Yokohama. What happened to American trade during the years of the great war, will never happen again. Americans hold no grudges or hard feelings. They are under deep obligations to both British and Japanese for tuition in the rudiments of ocean transportation. The lesson works both ways. Our British friends should ponder over this and let it go at that.

Hands Across the Pacific

WHEN the Japanese delegation started on its memorable voyage to Washington it was preceded by a business men's mission composed of some of the brightest and best of Japan's liberal element. While the diplomats were making friends in Washington the business men were meeting their American colleagues in friendly intercourse and driving home their fervid hope that a better understanding would take the place of the suspicion that existed at that time. At the head of this party was Dr. Takuma Dan, one of the pillars of the Mitsui interests. How well they performed their mission and backed up their diplomats is now seen in the following letter of resolution signed by 38 noted American business men and newspaper proprietors. The heads of the *Associated* and *United Press* services, the editors and proprietors of the *New York Times, Evening Post, Herald, World, Public Ledger, Boston Herald* and *Saturday Evening Post*, and leading financiers and captains of American industry have stretched forth their hands across the Pacific to clasp those of their colleagues in Japan, an assurance of an enduring friendship that will lead to bigger and greater things.

The original of the letter was written on parchment and signed by each of the thirty-eight persons. It is a historical document marking the opening of a new era.

December 9, 1921.

Dear Dr. Dan.—We feel that we should tell you of the pleasure and privilege it has been to us to have met in friendly intercourse you and your distinguished colleagues of the Japanese Business Men's Mission.

Your visit to the United States has been most timely and in the highest sense helpful in giving further impetus to the long-time cordiality and understanding between our two countries.

Your openness and frankness in making clear your desire for continued amity and co-operation between your people and our people, always our own cherished wish, have quite won our confidence and our hearts

We want to take with you to Japan the assurance of our steadfast friendship, and our hope so to work with you and your countrymen as to foster industry, commerce and lasting tranquility in all the Orient, and to promote peace in the world.

Dr. TAKUMA DAN,

Chairman, Business Men's Mission.

Signers of Testimonial

Japan Society, by Henry W. Taft, President; E. H. Gary, Chairman, U. S. Steel Corporation; Standard Oil Co. of New York, by H. C. Folger, President; General Electric Co., E. W. Rice, Jr., President; C. A. Coffin, Chairman; Westinghouse Electric & Manufacturing Co., E. W. Herr, President; J. P. Morgan; Mortimer L. Schiff, Kuhn, Loeb Co.; The American International Corporation, by F. A. Vanderlip, Chairman; Radio Corporation of America, O. D. Young, Chairman; American Locomotive Co., Andrew Flecher, President; Melville E. Stone (Associated Press); Louis Wiley *(New York Times)*; Allan Dawson *(New York Tribune)*; John Palmer Gavit *(New York Evening Post)*; Frank A. Munsey *(New York Herald)*; W. M. Hawkins *(United Press Association)*; Frank I. Gobb *(New York World)*; J. P. Morgan & Co., Thos. W. Lamont; Darwin P. Kingsley, President, Chamber of Commerce of the State of New York; Gerard Swope, President, International General Electric Co.; Edwin Morse, President, Boston Chamber of Commerce, Treasurer, Massachusetts Institute of Technology; C. F. Weed, the Frist National Bank of Boston; Cyrus E. Dallin, President, Japan Society, Boston; Robert Lincoln O'Brien *(Boston Herald)*; Alba B. Johnson, President, Philadelphia Chamber of Commerce; S. M. Vauclain, President, The Baldwin Locomotive Works; N. B. Kelly, General Secretary, Philadelphia Chamber of Commerce; J. G. Brill Company, Sam'l M. Curwen, President; Public Ledger by Richard Spillane, Business Editor; *The Saturday Evening Post*, Geo. H. Lorimer, Editor; First National Bank of Philadelphia, Wm. A. Law, President; I. Franklin McFadden, Honorary Consul of Japan, Philadelphia; Marcus Rauh, President of the Chamber of Commerce of Pittsburgh, Pa.; Aluminium Co. of America, Arthur V. Davis, President,; The Union Trust Co. of Pittsburgh, H. C. McEidowney, President; The Carnegie Steel Co., H. D. Williams; Pittsburg Plate Glass Co., W. L. Clause, Chairman.

So ends the campaign for harmony and co-operation. America and Japan have been brought into a close understanding. The pendulum has swung the other way. It may swing back, but not in our day, nor while such representative American names as the above have any influence in directing the policies of the United States. The names of the Japanese delegation headed by Dr. Dan are a guarantee that the pendulum will get stuck when it reaches its highest point and will not swing back.

* * *

Crisp and the Consortium

AT a general meeting of the British bank for foreign trade, Mr. C. Birch Crisp found occasion to condemn the new consortium along lines which proved so successful in 1912 when he succeeded in floating the first half of his £10,000,000 independent loan with the Peking government. The campaign of villification indulged in by the original promotors of the Crisp loan to influence public opinion in China against the sextuple group was one of the vilest that ever disgraced the profession of journalism. Headed by a subsidized Chinese government organ in Shanghai, and echoed by a section of the British press at home, the campaign against the consortium reeked with abuse of the British government and the British corporation that had so successfully carried the brunt of the financial battle for the advancement of British trade and prestige in China. It even went so far as to openly insult the American minister, one of the highest types of incorruptible American diplomats that our country has produced.

Mr. Birch Crisp's loan was sold to the public at 95, the bankers receiving 6 per cent. commission and the Chinese government 89. Subsequent events brought out the fact that the inside clique (in which figured the editor of the *National Review* and his Chinese partner, a high official of the Chinese government and close friend of Yuan Shih-kai) received a commission of 1½ per cent. as intermediaries. The squabble over the division of this part of the spoils was finally brought before the British courts where all the facts surrounding the deal were made public in the evidence. It was an excellent piece of business for the promotors and underwriters, but it broke China's credit, undermined the value of her outstanding bonds and compelled the foreign governments to stand by the sextuple group.

The strongest argument in support of the present consortium is the very deal which brought Mr. C. Birch Crisp into the limelight of Chinese finance. The evidence of the existence of the 1½ per cent. inside commission or squeeze to the promoting syndicate of Chinese officials and their journalistic partners convicts everyone connected with the deal of betraying the interests of the Chinese people. If the door is now opened for the present Chinese officials to negotiate independent foreign loans, the result will be a repetition of such grafting practices.

Mr. C. Birch Crisp declares that British and American financiers outside the consortium combine are most anxious to see its strangle hold on China broken. It is quite clear that they can have little knowledge of the real facts surrounding the present state of China's finances. It is perhaps true that many a fat juicy loan could be marketed at this time by financial concerns whose reputation alone would enable the bonds to be sold to a trusting public. But we repeat what we had to say in our May issue on this subject. Any firm that would take advantage of the present conditions in China to negotiate an independent loan with Peking and who would place such bonds on the market would be guilty of a crime.

* * *

中國政府鹽務稽核總所

Trimming the Salt Gabelle

JUST imagine trying to do business with the Chung-Kuo-Cheng-Fu-Yen-Wu-Chi-Ho-Tsung-So. The name itself is enough to start something. Foreigners in China abbreviated it to two words, and the Chinese followed by trimming it until there is nothing left to its original meaning but a tradition.

First, Dr. Sun Yat-sen from the presidential chair at Canton, lopped off a word or so and crippled its honorable significance. Then General Wu Pei-fu, straddling the Kin-Han-Lung-Hai railways at Chengchow, got tired of having all these ideographs staring at him as the salt treasure rolled by on its way to Peking, and appropriated another handful. Now comes the ruler of Manchuria, his super-excellency, Field-Marshal Chang Tso-lin, who says that the title as trimmed by Sun and Wu conveys no meaning at all and he will not have the beautiful classical language of the sages murdered in that fashion in the provinces under his control. So another batch of characters have gone from the title and only the words "Chung-Kuo" remain, and even the 中 will not stand up straight.

For editing the ponderous title, Sun was acclaimed a patriot: Wu, a scholar and a gentleman, the "Hope of China." Chang Tso-lin was also acclaimed as (this being an engineering magazine, we adhere to technical terms) the name the old Scotch engineer hurls at the boob who drops a monkey-wrench into the machinery. There was also great hopes expected of Chang, and again it would not be polite to put into plain English just what these hopes led to.

For the array of ideographs at the head of this article, is the Chinese official name of the jolly old salt gabelle that provides the surplus which makes the financial wheels go round in Peking. It has been trimmed, and trimmed, and trimmed until all the surplus has been trimmed off. Even the dashes have disappeared and Chinese bondholders have coined a name of their own for it that has to be edited and expressed by a type case full of asterisks.

The associated legations mildly expressed their disapproval when Dr. Sun started to mutilate the beautiful title. They vigorously protested when Wu Pei-fu tampered further with the classics, and are now "banging the table" right violently in order to emphasize their anger at Chang's contempt for ideographs which in former days would have caused him to tremble and *kowtow*. Chang simply has no regard for the proprieties of high-sounding diplomatic official titles and his brusque deletion of superfluous characters takes the surplus out and leaves hardly enough salt in the gabelle to season outstanding bonds. There is no salt left for future coupons.

"We should worry," answer the Chinese. "The friendly powers have provided us with a fine substitute to take the place of the trimmed-to-death-salt-surplus. We will soon have the increased customs duties, and this will come under the supervision of the Tsung-Shui-Wu-Ssu-Kung-Shu." This, they admit, is difficult to trim. But one never can tell what may happen to these long Chinese names when military purists in the various provinces start to abbreviate them. On the very face of things, this title is also too long. It needs editing. In this case, the title translates into the high-sounding words of "The Inspectorate-General of the Chinese Maritime Customs."

A word to the wise should be sufficient. Experience is the best teacher and to avoid tampering with this name on the part of uniformed exponents of Chinese classics, the legations should engage a good strong arm editor and cut that title down to the "Chinese Customs," or just plain "Customs." Stop and think what trouble would have been averted had such a man been on the job when the salt gabelle was christened in Chinese. For, as sure as fate, when the increased customs revenues goes the way of the salt, wine, tobacco and other securities, another handful of ideographs will be added to the Tsung-Shui-Wu-Ssu-Kung-Shu, and unless the powers maintain a squadron in every treaty port and a brigade at all frontier posts to protect the purity of the Chinese classics, some swash-buckling, sword-rattling scholar is bound to trim the customs in the same manner as they trimmed the surplus out of the salt gabelle.

* * *

Gee! What a Wad!

IT was not very long ago that Lord Northcliffe poured out the vials of his wrath upon Japanese propaganda. Now comes the Duke of Northumberland and charges Mr. Lloyd George with having corrupted the British press by conferring titles on 49 men who control important newspapers of the British empire. The descendent of a long line of belted earls probably resents the elevation to knighthood of scriveners whose pens are now mightier than the sword, but the days are past when the soldier, courtier, and sycophant can monopolize the honors of a nation. The British premier showed excellent judgement in honoring those journalists whose work during the war overshadowed the labors of many who earned titles for executive, civic or other virtues. If the Germans are correct in declaring that British propaganda destroyed their *moralé* and paved the way for the armistice, the distribution of a few titles was little enough reward for those responsible for bringing this about. In conferring knighthood upon such newspapermen as Phillip Gibbs, Percival Philipps and others, the king and premier of Great Britain honored the entire profession of journalism. It was a small recognition for strenuous and excellent work rendered the empire under the most trying and hazardous conditions, work, that in the end, undermined the efficient propaganda of the enemy and destroyed their confidence in themselves. American journalists rejoiced with their British colleagues when such men were singled out for knighthoood. Northumberland's grouch won't get much of a raise out of American editors.

We turn now to another film and we have before us on the screen the picture of a British adviser to the Chinese government lifting the curtain on the inside working of the Chinese propaganda system.

It appears that extreme hard times compelled the ministries of finance and communications and the salt administration to suspend the subsidies hitherto paid to Chinese and English newspapers published in China. According to well-informed newspapers of the Chinese capital, this economical necessity got on the nerves of a distinguished British adviser to the Chinese government, himself a well-known writer and journalist, who at once repaired to the palace and prevailed upon the president to have the payments resumed. One Peking newspaper (apparently not in on the graft) states that under the *régime* of Pan Fu as assistant minister of finance, these subsidies amounted to the sum of $125,000 per month, which, we assume must have covered all the domestic and foreign propaganda expenses of the Peking government.

A meeting of the Chinese press union was held in Peking to discuss the question of the suspension of subsidies, in which the members were informed of the activities of the British adviser in their behalf and of his declaration that such subsidies were eminently proper, being compensation for services rendered and if the government remained obstinate, he hoped the Chinese newspapermen would make a proper expression of their attitude towards the matter. The assembled journalists acting upon the advice of the gifted writer, thereupon threatened to act as strict supervisors of all acts of the government and to withhold all news concerning its activities, unless the subsidies were quickly restored.

As one newspaper in Tientsin puts it, "between this attitude and that of the blackmailer, burglar or highway robber there is no moral difference." Quite so.

A million and a half a year in press subsidies will help to explain many things. Next to being a *tuchun* or a general the best job in Peking would seem to have been the owner of an organ or the publicity agent of the powers-that-be. No wonder there was no money for other purposes. We have heard much about Japanese propaganda, but stand amazed before the supreme nerve of the Peking publicist, who with one hand in the treasury, has been hurling anethemas against all who hold opposite views. One million and five hundred thousand beautiful silver Yuans! Gee! What a Wad!

Sun Yat-sen

MALIGNED, slandered, misrepresented and hounded by a bitterly hostile press, Dr. Sun Yat-sen, the exponent of Chinese liberalism returns once more to his house in Shanghai, the victim of base treachery on the part of a swash-buckling militarist who stabbed him in the back, usurped his position and forced him to retire from Canton. The propaganda directed from Peking which has lauded Wu Pei-fu to the skies and denounced, defamed and abused the leader of Chinese democracy, has accomplished its purpose. Treason, ingratitude and disloyalty have been extolled as patriotic virtues in order to justify the betrayal of the man who stood in the path of Wu Pei-fu's ascension to the post of dictator.

It is difficult to understand what is behind the campaign to destroy the usefulness of China's foremost liberal. The defamers of Dr. Sun Yat-sen concede his honesty of purpose, his integrity and unselfishness. What higher qualities are desired in a political leader? Is there another outstanding figure in China of whom the same can be said? If there is one thing above all others needed in the reorganization of the Chinese government, it is HONESTY. Better an honest and untried executive, than an experienced grafter.

Is Dr. Sun an idealist? Does he incline to socialism? Has he a swelled head? Does he talk big? Well, there are, and have been in the past eight years, leaders that the western world has placed high on the pedestal of fame, of whom all these things can be said, and more. Dr. Sun is not alone as an idealist, he is not the only leader with socialistic tendencies, there are others who have communed alone with the Almighty and thought the future of the world rested in their care. Is Dr. Sun impractical? The accusation that he is, dates back to his railway scheme which failed, not because of Dr. Sun's inexperience, but because of the meddling in China's affairs by impractical, idealistic and swell-headed foreigners. No honest financier or engineer has ever called it impractical.

What then, is the matter with Dr. Sun Yat-sen? He is "a revolutionist," the "Mazzini of China," a "stromy petrol of politics." Admitted. But we add that any self-respecting Anglo-Saxon true to his blood and traditions would also have become a confirmed rebel against conditions such as have prevailed in China since Dr. Sun handed over the republic he founded to the arch-militarist, Yuan Shih-kai, the father of the present system of unbridled graft and oppression. For much less provocation violent revolutions have broken out in other countries.

When, in heaven's name, is rebellion justified, if not in the face of present conditions in China? How long must a people see their constitution fluoted and trampled upon? How long must they bear the yoke of a military despotism before rising to assert their rights? The time must come when some leader will arise and if necessary call in foreign assistance to restore the liberties of the nation, even as the people of England invited William of Orange to save them from the despotism of James the Second, and the American colonists accepted the aid of France in order to preserve their liberties against the oppression of George the Third. Is Sun Yat-sen to be condemned because he has exercised that right to rebel which becomes the duty of all right-thinking and honest men when deprived of their liberties by despots?

We hold to the conviction that if the constitution is to prevail in China, if a duly elected parliament is to function and the armed forces of the nation subordinated to the civil power, then this great step forward along the path of liberal government will never be taken by a dyed-in-the-wool militarist. If democracy is to triumph, if peace, happiness and justice is to prevail in this unhappy country, it will come only through the sacrifices of some idealist, some constitutionalist, revolutionist, some Mazzini, that history will call a great patriot. That honor we firmly believe is in store for Dr. Sun Yat-sen.

We know these opinions are unpopular in China, but we also believe that once the propaganda against Dr. Sun is terminated and people permitted to get a proper perspective on all that he has accomplished, that justice will be meted out to him. To our mind, despite all his shortcomings, all his errors—and they are many—he stands head and shoulders above the leaders of the Peking mandirinate whose inefficiency, corruption, self-seeking and trampling upon the rights of the people has fully justified his various attempts to restore parliamentary and popular government.

* * *

The Effect of Civil War on China's Railways

(*Contributed*)

CHINESE commanders cannot or will not understand that single line railways have to be run with the greatest care to avoid accidents, and it is little short of a miracle that they have so far had none as a result of their playful habit of running successive trains without staff or tablet.

Of the above statement, which appeared in local press report, it may be said that the half was not told, that the Chinese general is not so much at fault as his underlings, and that the extent of the miracle is not confined to insane infringements of traffic regulations.

The high officer in the present war has given every assistance to ensure proper working of the traffic, but generals or officials of sufficent rank cannot be stationed at every wayside station whose proper supervision is vital to proper operation of the line. Even if China were not a stronghold of nepotism and a prey to the sinecure holder, delegation of authority to men of deficient education and intelligence is inevitable at present. The bucolic relatives of the country-bred concubine and the sophisticated by heavy-eyed decadent who owes his position to "services rendered," are not calculated to make efficient railway traffic officers.

The railway machine itself suffers from the same defects. Only the foreign traffic official can flourish Chang Tso-lin's or Wu Pei-fu's visiting card in the face of the man with the Mauser pistol with any hope of success in argument. You can be armed with a proclamation signed by the Lord of All threatening death to the disobedient, and yet fail to eject three coolie soldiers from as many cars which have been converted into convenient bijou residences for a period of weeks.

In an army where mobility of responsibility is thoroughly understood and only a very local obedience is exacted, the written word is of no avail. You are only shot at dawn if the displeasure of your immediate overlord is incurred. Thus it is, that regulations are tolerated when there is no special urgency and thrown to the winds at times of stress. In retreat, or at times of urgent concentration trains are run on single lines at dangerously short intervals, entailing the suspension of all traffic in the opposing direction. Then, when the inevitable congestion occurs, some gilded one cries, Hold! Afterwards, long afterwards as time is measured in the west, the railway undergoes a period of convalescence, during which the clotted rolling stock (the two-mile long processions of engines and cars) is broken up and reshuffled, not for the use of merchants on the brink of ruin, but to await the pleasure of the fickle-minded militarist who clings to it as he does to life or the pay of his men. This reorganization is perhaps carried out in the intervals between the local commander's naps when opium's wondrous dreams would be disturbed by the shunting of his saloon car, which, in all probability, blocks the main line. At length the railway creeps back to the anaemic life of perhaps a train each way per day, all that is possible with war's demands on rolling stock.

A railway is not generally considered a very fragile piece of mechanism. Nevertheless it demands common sense attention to avoid disaster. Thus drivers and firemen must have rest, a hot axle brooks no neglect, it is manifest unwisdom to grossly overload a car with ammunition, and still greater foolishness to marshal that car near an engine or next a fodder laden car on which cigarette-smoking soldiery loll at their ease. Yet these and many other obvious precautions are wilfully neglected unless a foreigner observes them and insists on attention. That providence which protects the ignorant and incapable has miraculously befriended the Chinese armies. Their luck should become proverbial.

One would think the soldier incapable of doing much harm to the open cars in which he usually travels. However, he does his best, by cutting away the sides when doors are not wide enough for his needs, or by making firewood of the doors, while he elects as a rule to light his cooking fires on the top of a fuel laden car.

Occasionally the soldier revels in the superior comfort of a coupé car with upholstered seats. The trouble may start with the investigatory bayonet, or the wrench at parting with his comforts. The result is always the same; most of the car goes with him. The leather covers, the horse-hair stuffing of the seats, all brass hooks, ash trays and rack rails accompany him. He even attempts to pick the expensive plate glass windows out of their frames, and invariably smashes them in the hastiness of ineptitude or the rage of frustration. The car is left a smoke and grease begrimed shell, filthy in the extreme, verminous, redolent with the rancid oil of meals either cooked on the coupé floors on primitive charcoal stoves, or even on a chimney-less brick stove erected on a linoleum floor. Who is to blame? Certainly not the soldier, who brings with him the primitive habits of the dank, dark hovel on whose never cleansed mud floor he once wallowed with the family pigs and a bundle of evil smelling rags afflicted with a Job's collection of skin diseases for which dirt alone was responsible. Naturally he pockets everything that is portable or strange with a view to its sale or conversion into something to serve his simple needs. The bull in a China shop is not more expensive or more out of place than the coolie soldier in the luxury of a modern passenger car.

The financial effect is even worse. The earnings of the Peking-Mukden Railway in 1919 amounted to some $1,600,000 (£200,000) per month. The railway has been practically paralysed for six weeks. Moreover, its earning power has been greatly reduced for an indefinite period. Something like one-quarter of its revenue is derived from the carriage of some four millions tons of coal annually from the mines district to the sea. The rolling stock is therefore principally concentrated in this area. Chang Tso-lin in his retreat, took with him into the comparatively unproductive Manchurian regions, 120 main line engines out of a total of 140 and the bulk of the rolling stock, thus leaving the mining area in a hopeless position as regards transport. Of the 10,000 or more tons which can be produced daily, the railway can now move only 2,000 tons if unhampered by troop movement. The mines are thus compelled to pile up output as long as storage space is available and then close down until-long-drawn-out negotiation secures the return of locomotives and wagons which will than need a further idle period in the shop before being fit for service.

Further, there has been the usual top-to-bottom reorganization of government by the victorious party, in which well-tried permanent officials have been supplanted by new men. This, of course, cannot fail to have its effect on the machinery of railway administration. The permanent official is an unavoidable part of efficient management. Office lore, the wisdom of experience, a knowledge of the files, and the dusty contents of pigeon-holes, are very necessary when these repositories were until recent times the haphazard holes of a mud-walled palace.

Railways protected from war damage by treaty are somewhat of an anomaly, but this is the case as regards the Peking-Mukden Railway within the province of Chihli. By the railway agreement incorporated in the protocol of 1902, China is forbidden to keep troops within certain specified areas, must confine hostilities to a zone distant at least two miles from the railway and not damage the line as to cause traffic interruption for a greater period than 48 hours. Further prolonged suspension of normal traffic is forbidden between Peking and the sea, and to ensure this, a train under the protection of the troops of the treaty powers circulates in this district.

With the exception of an ineffectual attempt to blow up a bridge these somewhat exacting conditions have been observed with care, but a tremendous amount of minor damage has occurred, while trenches have been dug right up to the tracks an infringement of treaty conditions as regards war area limitation.

The war has reduced the number of military autocrats by one which is a step in the right direction, but he would be bold who would prophesy the dawn of that era of profound peace and rigid but wisely directed economy which is absoultely necessary for China's regeneration.

* * *

The Diplomatic Status of Famine Relief

By Laurence Impey

IN the first place it is necessary to consider the origins and presumable intentions of famine relief, past and present, in relation to its uses in China. In the past it may be said with every appearance of truth that the funds raised for famine relief came from purely exterior sources and were in the minds of the donors to be devoted to direct famine relief, that is, the provision of food and clothing for the absolutely destitute.

It has gradually become apparent to those on the spot that this is a mistaken principle to apply, inculcating, as it does, the lesson of pauperism and in its place, there has been developed the theory of labor-giving relief. This is well illustrated in the famine of 1920-1921, in which I was myself employed, where the American red cross China famine relief and the international famine relief committee were both at work in the same field, one employing the theory of more or less free relief and the other giving no relief except for work of national importance carried out, on one of their construction schemes. By this time, however, the sources of the funds used, differed from those of the previous famine eras and it is necessary to consider these sources next.

The American red cross funds, as of old, came purely from outside and were thus entirely at the disposal of a foreign committee, which decided to have them handled entirely by foreigners and on a constructive basis.

The international funds, on the other hand, were partly from foreign sources, partly from foreign and Chinese subscription in China and also partly from funds allocated from a surtax on the customs and on the telegraphs, Chinese organizations, though in one case under foreign and diplomatic control. Therefore it may be argued, not unnaturally, that the Chinese should have some say in the expenditure of these funds and this was in point of fact allowed for by the election of a joint committee to the international famine relief. This, then, obviated any difficulty as far as they were concerned, during the period 1920-1921.

To consider next the position of the red cross, which had a scheme of road construction in several of the provinces, the expenditure on which amounted to something like $2,000,000 in all. This road construction was work on which the greatest number of famine sufferers or unskilled labor could be employed and it was chosen for this reason in preference to other schemes which were put forward. It was, however, necessary that a right of way for the construction of the various roads should be obtained, before work could commence, and it was obvious that the American red cross could not use foreign funds with which to purchase land in Chinese territory.

This difficulty seemed a very real one at the outset, but it was overcome by agreements made with the provincial governors on behalf of their provinces that certain Chinese funds should be allocated to this purpose and that all land required should be measured and purchased by agents and representatives of the civil governor.

I think I am right in stating that in neither of the two provinces in which I was personally working was this agreement carried into effect and I know that up to the time of the closing of the work in the summer of 1921 this had not been done and the result was well nigh to being disastrous.

In two cases, agents of the authorities were going among the people and stating that they sympathized with them in this expropriation which they were forced to carry out, but that it was the foreigners who were the responsible parties and they themselves were powerless in the matter. If the reader will consider for a moment the state of mind of a small farmer, who was being rendered destitute by the seizure of the whole of his little plot of ground for road construction, he will be able to realize the possible state of affairs after the relief work closed down. This is stated thus in order to make the point as to the impracticability of co-operation with officialdom in such work and the dangers and difficulties which may be encountered by outside assistance.

In the famine of 1922 the American red cross took no part and the International famine relief committee dissolved and reconstituted itself as the international famine relief commission, with headquarters in Peking and branches in various provinces. The funds at their disposal were the surplus from the previous year and the customs surtax as before and the commission was again composed of a proportion of foreigners and Chinese. Direct relief and road construction have been again resorted to and on this occasion a third item, which was rejected by the red cross the previous year, has been carried into effect, namely the building of river dykes as a means of flood prevention. It is an undoubted fact that the dykes of the rivers of China are in a most deplorable condition, threatening destruction to very large areas unless immediately repaired. The old Chinese authorities who are responsible for this work seem determined to neglect it altogether, in spite of many warnings, and the result was to be seen in the devastating floods in the Yellow river, the Huai river and the Han river areas this year, which carried death and destruction for hundreds of miles. The point for our consideration comes in the expenditure of the funds. In road construction bridges may be said to be the only outlay which is not of a relief-giving character. In dyke work about fifty per cent. of the funds must be expended in the necessary materials for construction purposes. Then there is another point which might be raised.

Is it famine relief only to employ famine sufferers and only to repair dykes which have already broken and caused a famine, or can the work be applied to the repair of dangerous dykes, which will undoubtedly break in the future if not attended to and therefore cause a famine. It is a question in fact, of famine prevention *versus* famine relief and I must admit that my sympathies are strongly on the side of that old proverb which says "Prevention is better than cure."

On the other hand it must be admitted that this work is trenching on preserves which should of right appertain to a conservancy board and I think that ultimately it will be realized that in this lies the solution and the only solution, of the difficulty.

Let us then devote a few moments consideration to the possibilities of conservancy work and the difficulties in its efficient organization. In the first place it appears to be impossible to co-operate satisfactorily with the present official *régime* and it is certainly unthinkable that such work should be delegated directly to them without outside supervision and control where foreign funds were concrned.

Work of this nature must in the present state of things be provincial rather than governmental, having regard to the total lack of authority on the part of Peking, but on the other hand the only available funds come from foreign or governmental sources, which would indicate the necessity for foreign or governmental control.

It would seem, therefore, that any conservancy board at present constituted would need to have equal foreign and Chinese representation, the Chinese to be divided between nominees of Peking and the province concerned.

Secondly, the members of such board would have to be of the educated and modern type as opposed to the corrupt officialdom, in order that the board should function satisfactorily.

Thirdly, all persons employed on the work of construction must be properly qualified and not as in the past, ignorant and useless nominees of some high official.

One point which appears to me to be a little uncertain is this. If foreign funds are voted for such purposes by the famine relief commission, and foreign representatives sit on the board as their nominees, do not they to some extent approximated to representatives of other nations who are interested in such engineering propositions, as say railway construction, which has been placed more or less in the hands of the consortium for settlement and may not Chinese themselves choose to regard this assistance thus proffered as a violation of her sovereign rights ?

Part II

Accepting the suggestion of conservancy boards and road boards in theory for the purposes of discussion, it now remains to consider them from a technical attitude, and formulate the necessary work which they are best able to carry out. Road work has been pretty thoroughly explored as a famine project and the data acquired furnishes sufficient information for a working basis. The missionaries in the area concerned can supply recruiting agents who will bring in the famine sufferers and they can then be formed into gangs under their own leader.

A certain area of road construction can be alloted to a number of villages who are suffering, for it is better to keep the workmen within reach of their own homes, as on several occasions we found that riots resulted from the allocation of labor to a strange neighborhood, where the local people, perhaps themselves suffering, not unnaturally regarded it as an intrusion.

It is undoubtedly better to pay the workers in kind whenever possible, as it does away with most of the opportunity for 'squeeze,' though the handling of foodstuffs in such large quantities with the inadequate railway accommodation of China, is a matter of some difficulty.

With the exception of possible bridges there need be no contractors employed, if sufficient foreigners can be obtained to handle the workmen, either direct or with the aid of an interpreter ; and this has not proved to be the case on conservancy work in the past.

The survey work necessary for the road construction is of a much less skilled character than that needed for river work and can be carried out in much less time, while it also admits of modifications in plan during construction.

Transportation is the chief difficulty, as it concerns both the commissariat department and the engineering department alike, one with regard to the feeding of labor, and the other as to his duties of surveillance.

Leaving road construction aside as being already sufficiently dealt with, let us devote some thought to the problems that first confront us in the matter of conservancy work.

In the first place a primary survey must be made, covering the whole area of the river basin with its tributaries and extending into the mountain ranges from which the flood waters are derived.

It may not always be necessary to trace the river right to its source, though this is desirable, but nice judgement will be required to decide at what point in the course of the river it is safe to bring and how much can with safety be neglected.

To refer to a particular instance, with which I am personally acquainted, the course of the Han river would need to be topographically considered at least as far as the first important range of hills, which may be said to more or less define its course up to that point.

This would mean a survey some six hundred miles in length, by one hundred in breadth and would take about six months to prepare at a cost of say one hundred thousand dollars. Dependant on this primary survey would follow a second survey, which would prepare plans of the course of the river on a large scale, only taking into consideration the area in the immediate vicinity of both banks. Soundings would have to be taken and cross sections prepared, together with a table of water levels at various points at all times of the year, in order that the volume to be handled could be satisfactorily estimated. These further surveys would probably cost another hundred thousand dollars, this sum total of two hundred thousand dollars, should prove to be sufficient for all requirements and with the exception of the water levels, could be put through in a little over six months. Then there comes the question as to what is the best policy to form on the data acquired and here the advice of an expert is necessary.

From what I have seen of the Han river, I will hazard a few suggestions which would probably be found applicable to other rivers in China also. In the first place the perpetuation of the present irregular course of the river is only courting destruction and a straightening of the channel in many places is absolutely necessary and will, moreover, prove a great benefit to river navigation, particularly that of Chinese junks, which are dependent on sails and oars alone and which are held up at every few miles by an adverse wind at a fresh turn in the river. Whether to cut connecting canals, or whether to use dredgers with pipe lines to straighten the bends in the channel, or whether to use a combination of both, is a matter which needs further consideration than we can at present give it.

Next there comes the question of the dyke as at present constituted, and whether it can be used in some part at least.

The Chinese have unfortunately given it almost no foundation and the water has undermined it to such an extent in many places, as to render it very difficult to repair. Piles can get no footing and rock mattresses will not lie well on such a steep and shifting slope, so that it seems possible that it will be necessary to build anew behind the old line and thus ensure good and proper construction. Owing to the fact that piling, fencing, rock building, etc., are more or less skilled occupations, it has proved impossible to employ direct famine labor on it and a system of contracting for earthwork, pile-driving, rock bunding, wiring, etc., has been entered into. This does away with payment in kind and the giving of relief where it is most needed and a wonderful system of graft enters into the proceedings at once, which, as far as I can see, cannot possibly be avoided.

Then there is the question of local contractors *versus* outside ones, a question which has given considerable trouble this year, for the local contractors are quite ignorant of the recognized methods of drawing up a contract and can see no reason why their tender should contain their lowest price for the work, in fact it never does and as soon as they discover that they have not got the contract they come round and lower their prices to what figure they think will be acceptable. Again, they have no guarantee for penalty in case of absconding, neglect or unsatisfactory workmanship.

On the other hand the outside contractor from a large city, who knows something of the work and has a guarantor, is higher in price and also is regarded as a foreigner in the locality, so that his materials are stolen and his men are boycotted and food rendered very difficult to obtain.

Timber for piling and rock for bunding have to be purchased at a distance from the site and shipped up or down as the case may be and the transport of funds is no easy matter in an area which quite possibly will be infested with bandits.

Part III

Having considered some of the diplomatic difficulties in the past and glanced at a few of the engineering problems, I would like to put before my readers an outline of the future.

In order to do this I think I cannot do better than append the agreement which was drawn up and signed by the Hupeh international famine relief committee on the one side and the civil governor of Hupeh on the other and which related to the work carried out during the spring and summer of 1922, at Sze Tze Kow.

AGREEMENT

This agreement is made between the Hankow international famine relief committee and the board of finance of the province of Hupeh, for the repair of the levee at Chow Chia Chuai in the district of Tsung Chiang. The terms of the agreement are as follows:

1. The total estimate for the work is $100,000.00 Mex.
2. This amount of $100,000.00 is to be provided jointly by the parties concerned. (The money is to be deposited in some bank.)
   The money is to be paid into the bank on the following dates as follows: February, $20,000; April, 15,000; May, 15,000.
3. The money to be used for the levee work is to be paid in the first instance into the Bank of Communications.
4. The above appropriation for this work is to be under the joint control of both parties.
5. All payment vouchers are to be signed by both parties, otherwise they shall be void.
6. All the engineering works are to be under the joint control of both parties, each party appointing an engineer.
   The engineers are to consult as to the plan and progress of the work, in order that it may be carried out in the best possible manner.
   All the field force are to be hired upon joint consultation.
7. After signing the agreement both parties are to decide a definite date upon which to start work.
8. This agreement is made out in duplicate, each party keeping one copy.

Signed and Dated,
the 11th year of the Republic of China, March 20th.

This agreement sounds very nice on paper the first time that one reads it over, but on further consideration there are various points that present themselves for further reflection.

The first three paragraphs pass without discussion, but the whole difficulty is raised by the fourth and following ones.

The funds can conceivably be under the joint control mentioned, but in that case what happens if there is a dispute?

The vouchers can be signed by both parties, but what if one party declines to sign any particular voucher?

And above all how can you have two chief engineers on a job working in a sort of partnership?

Again, in practice it is difficult to hire your field force jointly.

What actually occurred in this case was this:

The committee placed all the funds in the hands of a firm of accountants who placed cashiers in the field.

The committee appointed an engineer who took charge in the field.

The engineer appointed all the staff through the committee and placed all contracts.

The government appointed a representative who was not an engineer and who knew nothing about engineering or accounting, but who fulfilled the functions of both on their behalf.

He recommended his brother as a foreman when he was already a contractor and finding the contracts were already tendered for he retired gracefully into the background, whence he emerged occasionally to nod his head sagely at the work and sign vouchers which had already been paid.

This scheme works perfectly well, but it hardly seems fair to the other side, if they had perchance any real desire to make themselves a force for good, instead of a nonentity.

Considering matters from this view point it becomes evident that:

1st. Funds must come from joint contribution.
2nd. The government very justly may expect to be represented.
3rd. In previous conservancy boards a foreign engineer has been found to be a *sine qua non*.
4th. The funds must be under foreign supervision, in a foreign bank.
5th. The board must be at least equal representation of foreigners and Chinese.
6th. A reliable firm of accountants must be employed.
7th. It is vital that every facility be given by the local authorities to the engineering parties on the work.

8th. No unnecessary posts or appointments must be created.
9th. The old corrupt system of dyke officials must be done away with.

These matters having been presented for the consideration of the reader, we will now turn to a short outline of what has been done, or is proposed to be done, for the future in the matter of the formation of a conservancy board, in the Han river area or the Hwai river basin, both of which have been worked on by representatives of the famine relief commission, during the past six months.

With regard to the Hwai river scheme, the Shanghai committee have definitely decided to provide a fund of $150,000.00 to enable the board to function and to appeal to the authorities and famine committees of Kiangsu, Anhwei and Honan, to allocate similar amounts to the purpose.

It has been recommended that some engineer of high reputation be secured to advise on the scheme and Dr. J. R. Freeman has already been approached.

Data is being secured from Chinese records to allow such engineer to form some preliminary opinion as to the nature of the work and the high water measurements of the flood of 1921, are already being registered to this end.

The proposed formation of the conservancy board includes the following :—

Military and civil governors of Kiangsu, Anhwei and Honan.
American, British and French Consul Generals, Shanghai.
American, British and French Consuls, Nanking.

Provincial assemblies of Kiangsu, Anhwei and Honan, one representative each. The executive committee to be composed of five foreign and five Chinese members and two co-operating treasurers be appointed.

The formation of the conservancy board as outlined above has been undertaken in response to numerous appeals from Chinese and missionary sources and the committee has placed it upon record that :

"Our sole interest is to prevent future famines and neither this committee nor the Hwai river conservancy board, nor any member thereof shall directly or indirectly have any interest in the reclamation of land, or in any land speculation, or any claim on reclaimed land, or any interest whatever in schemes pertaining to profit from this Hwai river work."

This seems to cover the situation very fairly and the only point of general interest that is not dealt with, is the question of obtaining funds in the future by taxation or grant, to enable the work to be carried forward, as the possible grants of $600,000.00 already mentioned, will only start the ball rolling.

To turn to the question of the proposed Han river conservancy board, the arrangements there are not so far advanced in some ways.

The proposal of the famine relief committee is roughly this :

To raise a sum of $300,000.00 to be matched by an equal sum from the Hupeh government, making $600,000.00 in all.

To take $100,000.00 for the expenses of an immediate survey of the area affected and to invest the remaining $500,000.00 at say 8 per cent. interest, the sum obtained to be devoted to the costs of overhead expenses and the staff salaries.

The Hupeh government are to be asked to raise $500,000.00 annually by taxation for expenditure and the governor on being approached, is said to view the matter favorably and to promise his support.

A joint committee is to control expenditure, but no arrangements as to an engineering staff have yet been made.

The American red cross is being approached with a view to the advancing of certain funds and in this case it is proposed to allot one-half the representation to the Hupeh nominees and one-quarter each to the red cross and the international famine relief committee. Either party may withdraw from the scheme with their share of the fund's on one year's notice thereof and these features complete arrangements as far as they have gone.

One point is worth noticing : in the 3rd year of the republic there was a Hupeh conservancy board in existance, with allotted funds of some two million dollars or under.

The question is what became of those funds, are they still in the possession of some bureau, or is the board no longer in existance ?

An awkward situation might conceivably arise, if the old board appeared after work had started and asked for a share in the proceedings.

If these difficulties in the way of both the boards can be overcome, the persons in charge of the negotiations can satisfy themselves that they have made a very noticeable advance towards the development of China, and put through one of the best schemes of relief that has been projected here or in any other country.

* * *

Opportunity for Mining Engineers in China

By H. Foster Bain

Director, Bureau of Mines, Department of the Interior, Washington, D.C.

THE opportunity for mining engineers in China is limited despite the widespread presence of mineral deposits. The current notion that China is a country of unlimited mineral wealth is hardly in accord with the facts. Many deposits occur and there is a wide variety of minerals present, but in a majority of instances the ore bodies are small and of such type as not to lend themselves well to modern methods of mining. Many of them can be mined better and cheaper by Chinese methods or some simple modification of such methods, than by those used in America. So far as number of opportunities is concerned, therefore, the future lies with Chinese rather than foreign engineers, which is probably as it should be.

The young Chinese, now studying engineering in America and Europe, will have abundant field for work, provided they recognize the needs of the situation, are content with the scale of operations that the character of the deposits require, and are content to build on old foundations. A limited number of engineers, foreign or Chinese, will find a field in exploitation on a large scale and by modern technical and business methods of a few metal-bearing deposits and in mining coal. Then a large and satisfactory field may be expected to develop as the country becomes industrialized. Indeed, coal is the one mineral of which the quantity present is at least as great as has been represented. Extensive fields are present both in the North and the South and coal of wide variety as to quality is present. The mining conditions are by no means easy, resembling those of Europe and our anthracite fields rather than those obtaining in most American bituminous fields.

An excellent start in the introduction of modern technology has been made especially by and under the guidance of a brilliant group of Belgian engineers. The present trouble with the coal business in China is that the market is limited and except for a few centres of consumption the demand is scattered over a wide territory. Such coal as is sold goes out in small quantities and, with inadequate and expensive transportation, the final cost is high. The per capita annual consumption of coal in China is approximately one twenty-fifth of one per cent. in contrast with five and one-half tons in the United States. The difference from a business point of view is obvious. It is to be expected that coal mining will increase in China and a moderate sized iron and steel industry is already fore-shadowed.

The resources of iron ore, so far as now known, are not of the order of magnitude that will support a large industry. In the far western provinces, the geology is such as to lead to reasonable expectations of finding really large bodies of gold, silver, copper and lead ores and there are other indications supporting this anticipation. In Manchuria and Mongolia, there are gold placers that may well prove of first order of importance, but the disturbed political conditions and the number of bandits, added to the inherent difficulties of climate and distance, have so far precluded even adequate exploration.

In Hunan, there is probably the world's greatest supply of antimony ores. A dominant position has been acquired by a Chinese company which is managed by a very capable Chinese engineer resident in New York. It is entirely possible that in the antimony market the Chinese will come to occupy the same relative position as international nickel does in its field or the American producers do in supplying the world's need for copper.

In general, China produces a wide variety of minerals, but, up to now, does not even supply the domestic market. Further development is called for, but, because of the small size of the individual mines and the fact that such ore bodies can be worked better by hand than machines, the exploitation of the mineral wealth of the country is likely to rest mainly with Chinese engineers. —*Engineers and Engineering.*

Tsingtao International Club; Opening Day, June 1st, 1922

INTERNATIONAL GOOD-FELLOWSHIP AT TSINGTAO

TSINGTAO has set an example of international goodwill and fellowship deserving of emulation in other parts of China, where various nationalities, like birds of a feather, flock together and Chinese and Japanese "go by themselves." Shanghai has its Union Club organized to bring all nationalities together, and in a way, serves as link of understanding with the Chinese, but for all practical purposes it may be called a "senior" or taipan affair, lacking the popularity which the club deserves.

It comes as an agreeable surprise to learn that Tsingtao has taken the lead in the establishment of an international club for friendly and social intercourse that has brought together Europeans, Americans, Japanese and Chinese. The local residents are justly proud of their experiment, with every member pulling together to make the club a real link of understanding. Seated in the centre of the above group is General Yue, Japanese military governor, of the territory now being turned over to China. The presence of other prominent Japanese officials, merchants and bankers with Chinese and foreigners seems convincing proof that whatever opinions may have prevailed against Japan three years ago, ill-feeling has been superseded by a more cordial spirit of good-fellowship.

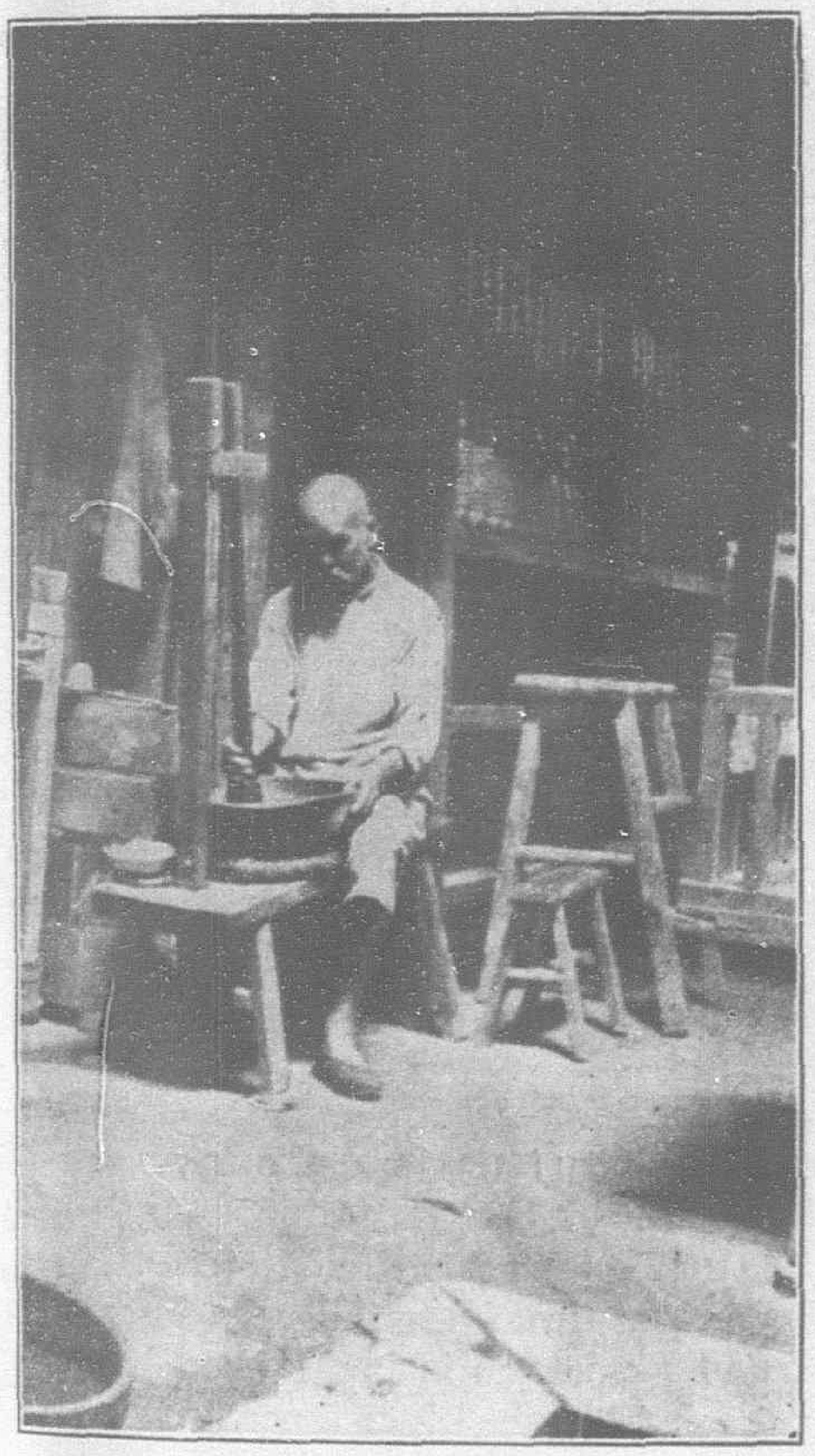
Chinese Kaolin for American Potteries

AMERICAN potters are looking around for a source of raw material that will permit a lowering of the high prices now prevailing for the finished product in the United States. Most of the *kaolin* imported into the United States comes from England and none from China. The cost of this clay has risen in England, according to quality and degree of preparation for the market by 139 to 225 per cent., in 1920 over pre-war costs which increase is reflected in higher prices to the American potter, and in the retail prices to the consumer.

While clay in its ordinary form is widely distributed throughout the world, the purest form—*kaolin*—is restricted in its occurrence in large quantities. In the United States the relatively few deposits of known commercial value are for the most part in the southern states, although California, Colorado, Nevada and Vermont, have important deposits and are producers of *kaolin*. It is probable that a thorough investigation would disclose large reserve *kaolin* resources in the United States. Even so, the question would arise as to the commercial value under normal conditions, that is, ability to compete in the domestic market with imported *kaolin*, for even the stimulus of the demand during the war, when American potters had difficulty in supplying their needs from foreign sources, did not result in a marked increase in the output of clay in the United States.

The fact that shipping and trade conditions and demand for special qualities of material may continue to cause the United States to bring *kaolin* from abroad, even though an ample domestic supply is available, should be borne in mind. Foreign *kaolin* was recognized as so vital to the domestic pottery industry that no order curtailing its importation was issued by the government during the war. However, during the summer of 1918 the British shipping authorities ruled that no clay could be exported from England to the ports of Boston, New York and Philadelphia in order to prevent congestion at these ports and leave shipping space available for other cargoes. This ruling was reflected in a marked diminution of imports from England.

This situation is turning the attention of American potters to other sources of supply and the department of agriculture recently sent out a special trade commissioner to make investigations. This gentleman, Mr. J. Morgan Clements, calls attention to the possibility of obtaining supplies of high-grade *kaolin* from China, and he believes that a detailed study of the *kaolin* deposits of China will result in the finding of deposits more favorably located to supply the markets of to-day than those now utilized in the ancient centres. In the interior of the province of Fukien, especially, there are several undeveloped *kaolin* deposits that appear promising in size and quality, and doubtless a search would disclose others more favorably located with respect to transportation than these.

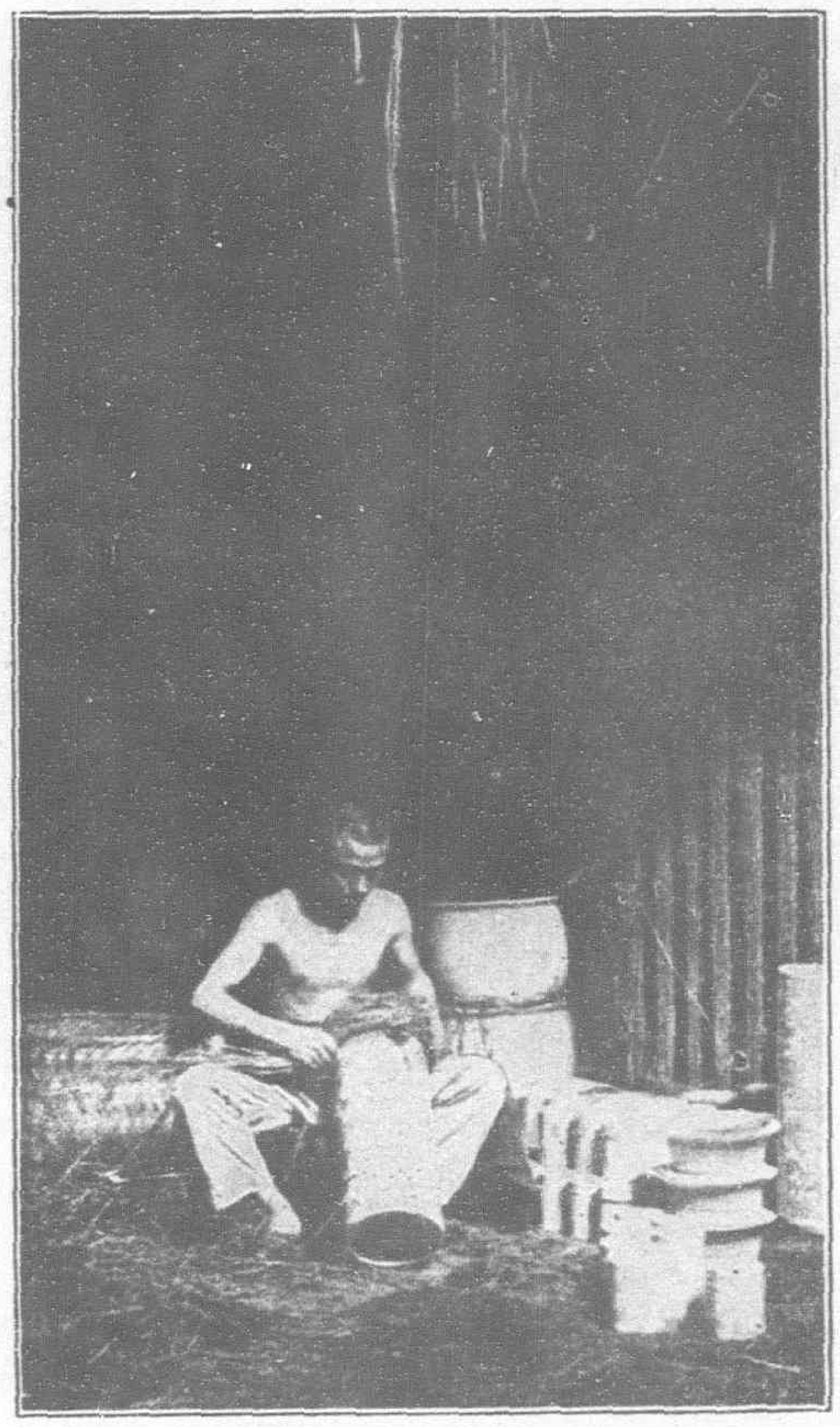

Mixing the Color

Pouring the Glaze

An Old Craftsman *(from "Asia")*

" The Chinese, so far as we know, first made porcelain during the Han dynasty, from B.C. 210 to A.D. 220. In A.D. 1004 the the Emperor King Teh established the imperial potteries at a place in the province of Kiangsi, south of the city of Kiukiang, on the Yangtze River, which received the name of King Teh Chen, and has ever since remained the chief centre of the ceramic industry of China. In the earlier centuries only white and colored porcelains were made, then about A.D. 1268 decorative painting of porcelain was introduced . In recent years potters of this district have begun to produce foreign styles of porcelains. There are reported to be somewhere around 150,000 potters employed. The clay from which the porcelain is made is, according to von Righthoven, a high-grade sedimentary clay.

Blowing the Glaze On



Packing for Shipment

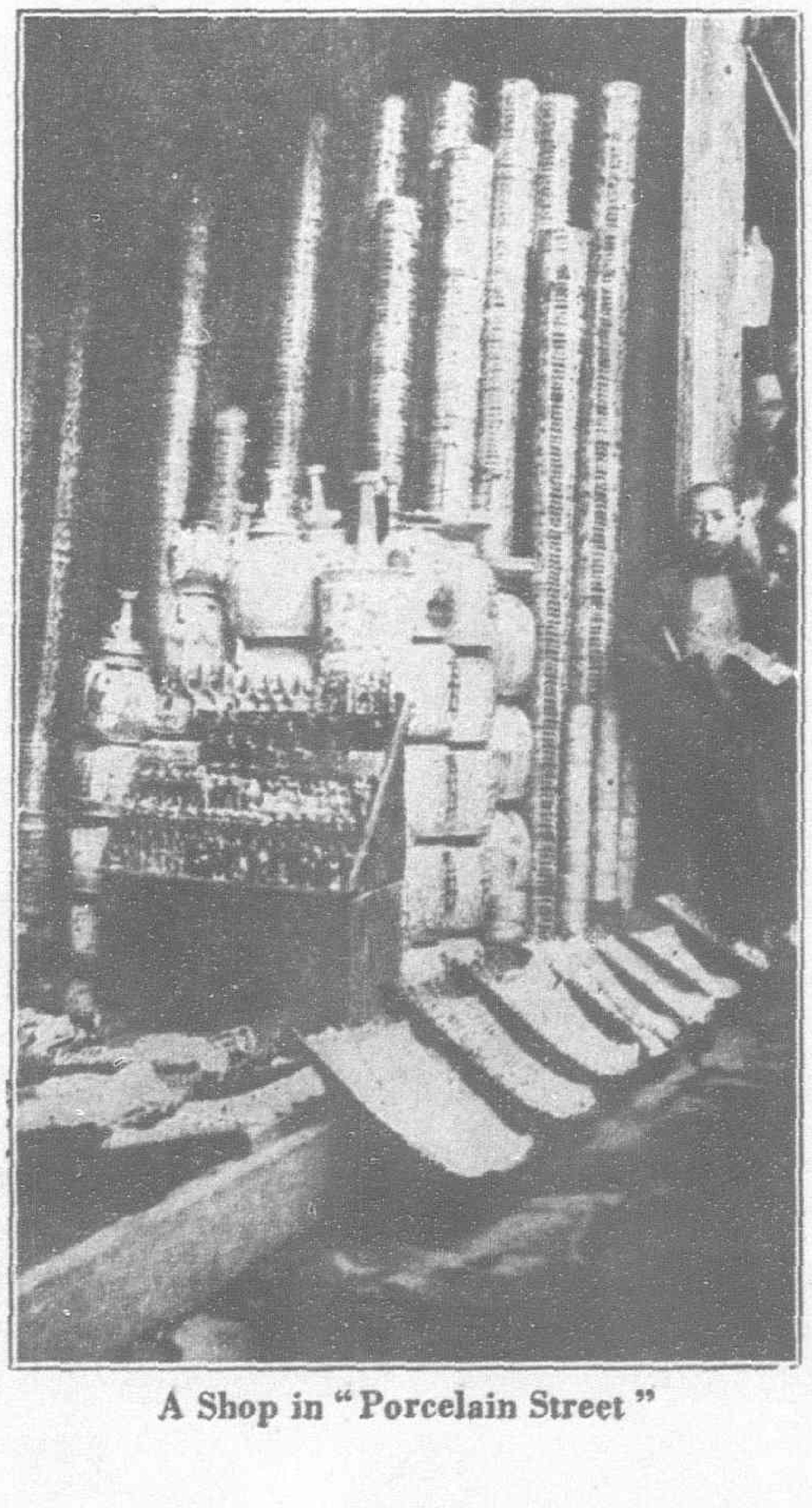
In a Kingtehchen Factory (*from "Asia"*

"The next porcelain centre of renown is Te Hua, in the interior of the province of Fukien, 50 miles due west of the coast city of Hing Wah. This centre has specialized largely in white porcelain statuettes, with other articles in white or with blue patterns, but has gone more recently into the production of foreign-style porcelain painted in various colors. Te Hua uses a high grade of *kaolin* which occurs in great quantity in the immediate vicinity.

"The third pottery centre is Shekwan, near Canton, in the province of Kwangtung. This is a comparatively new centre, the industry having been established there about 700 years ago. The highest grades of porcelain are not made in Shekwan proper, but are produced in Kochow, a small town in the same district. High-grade clays obtained in this locality are chiefly used, but it is stated that some *kaolin* is brought in. For a long time foreign shapes have been made here for the export market."

The best grades of porcelains are manufactured at the above three places, but ordinary pottery is made practically all over China, and in traveling in the interior one frequently passes through local pottery centres where earthenware bowls, teapots, vases, cuspidors, etc., are produced. All of the most important plants in which the highest-grade wares are made and which use the best grades of clay and *kaolin* are situated in southern China in the great area south of the Yangtze river. In many respects this area is comparable with the area embraced in the southern states of the United States, especially as regards temperature and rainfall—the important factors which influence the alteration of the rocks from which *kaolin* is produced. South China is more favored than the southern part of the United States in the wide distribution of the types of original rocks from which *kaolin* is derived and in the occurrence of large deposits of the clay.

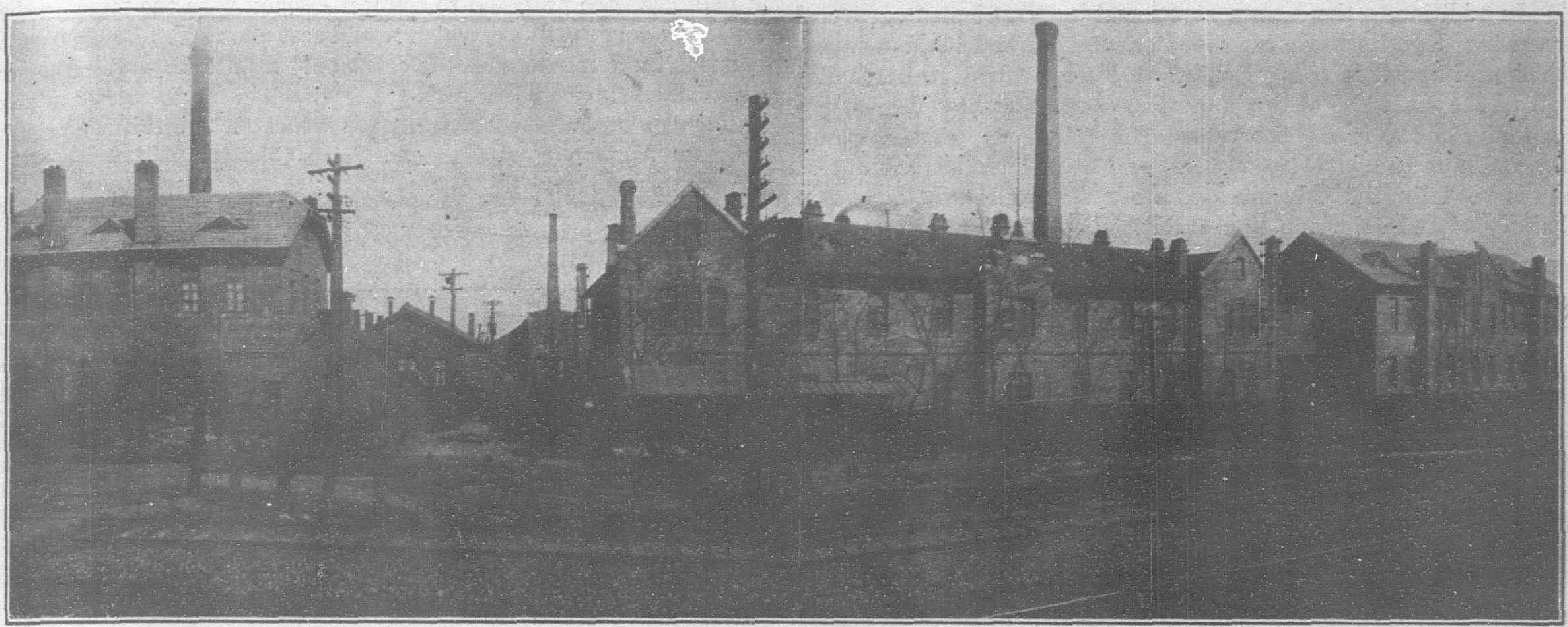
The high-grade porcelains are made from *kaolin* obtained within short distances of the pottery centres, but none of these *kaolin* deposits are conveniently situated for export. Transportation has not been in the past an important factor in the minds of the Chinese; the Chinese industries, especially the pottery industry, are the result of the gradual growth of centuries, starting with the object of supplying purely local needs. No consideration was paid in the first instance to factors other than the known occurrence of the raw material and the local market, the factor of transportation being negligible under these circumstances. Thus the output from the kilns at Te Hua is carried by porters in baskets, two balanced on a shoulder pole, distances ranging up to 100 miles to market.



A Shop in "Porcelain Street"

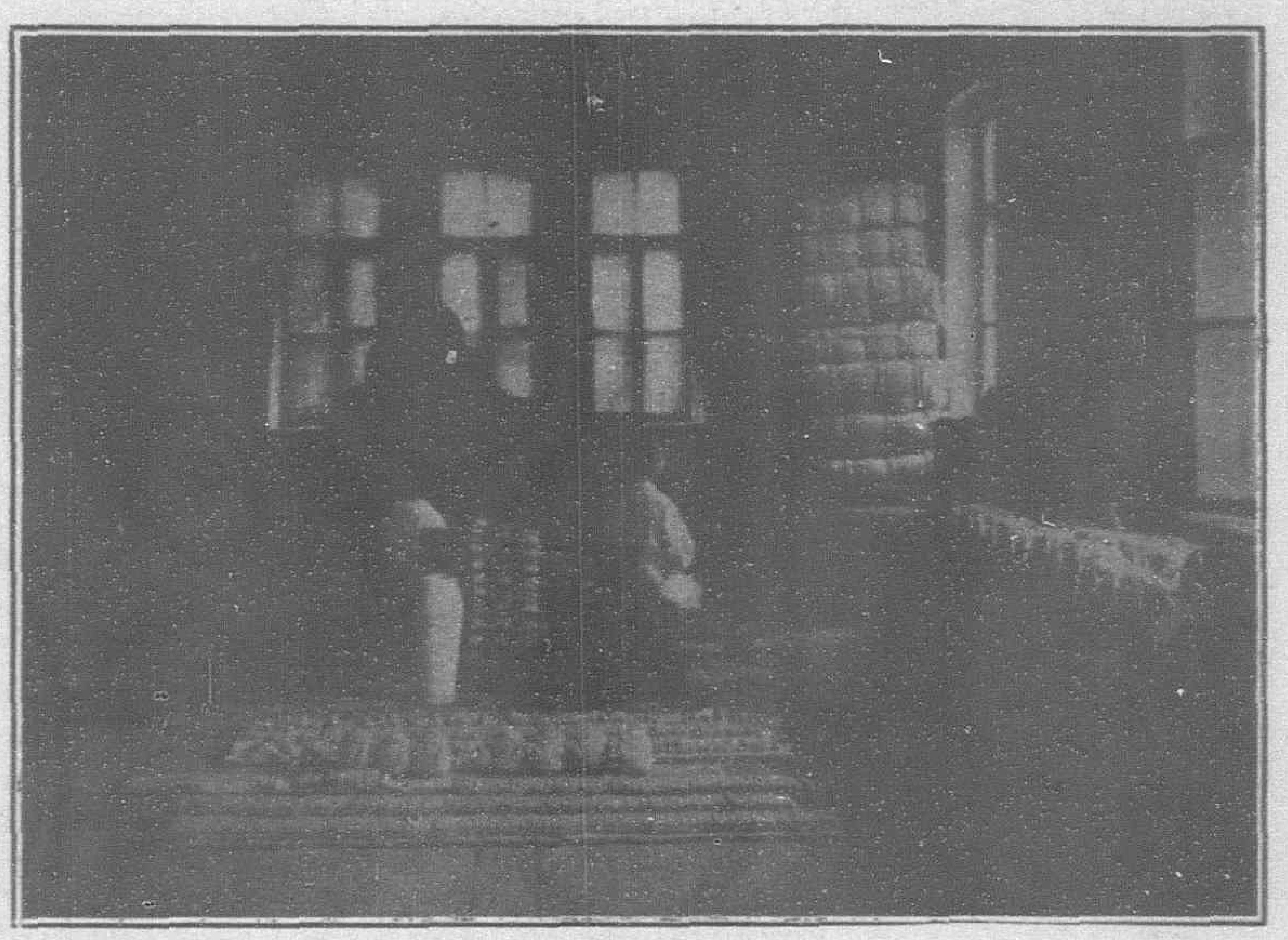
In modern practice, the economic assemblage of raw materials for the product to be made and the case of reaching the best markets are thoroughly considered before the location of the manufacturing plant is decided upon.

The most favorably located Chinese deposit of *kaolin* so far reported and which could serve as a source of supply for the foreign market, is in the province of Kwangtung, and as there is no pottery industry in this vicinity, the exploitation of the field should meet with hearty local co-operation, since it would offer continuous employment for a number of people otherwise dependent entirely upon the intermittent local agricultural demand for labor.



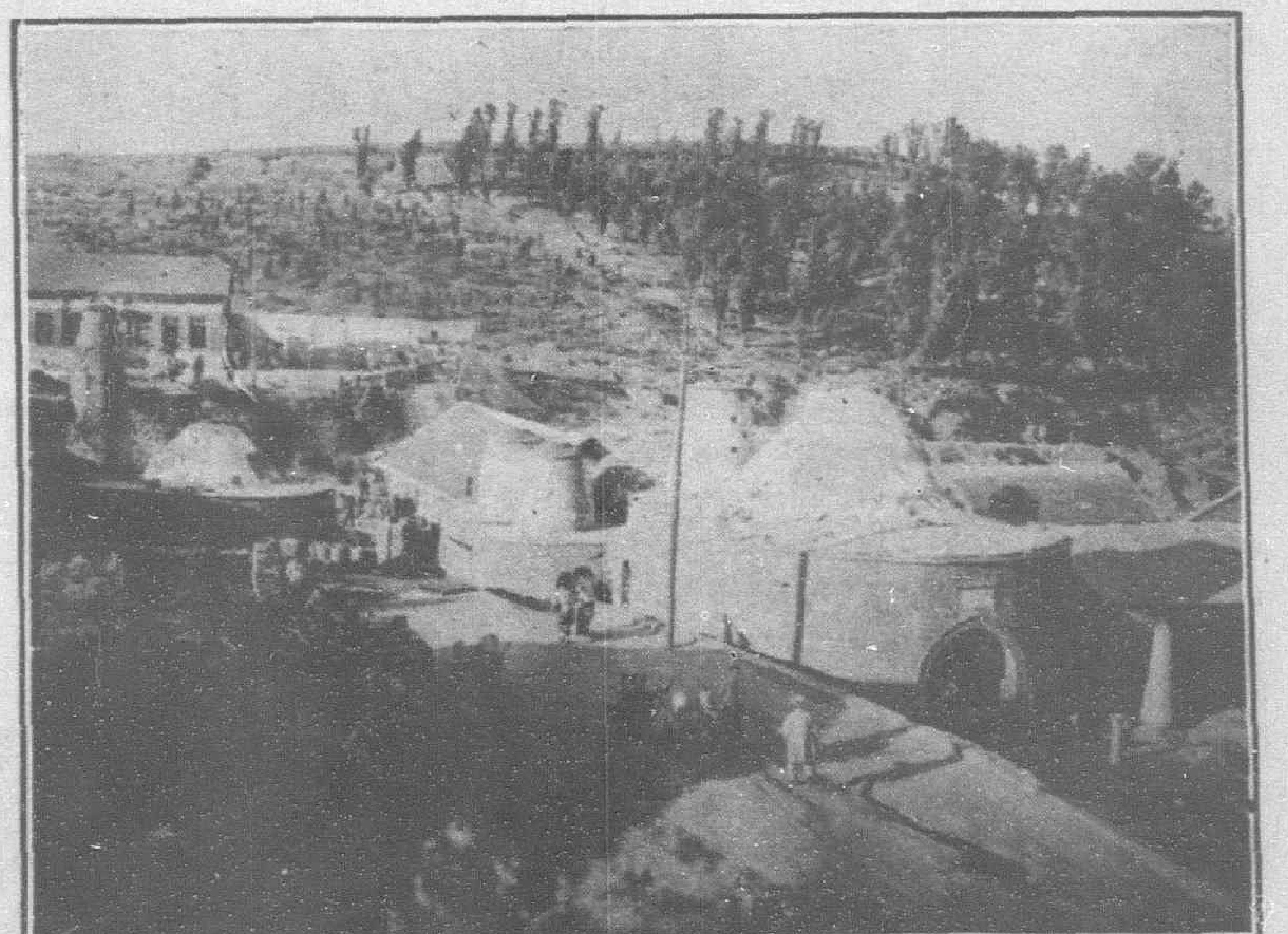
Ceramic Works at Dairen erected by the South Manchuria Railway Company and turned over to the Tahua Pottery Company.

Decorating Bowls



Packing for Shipment

Chinese Potter at Work, Poshan

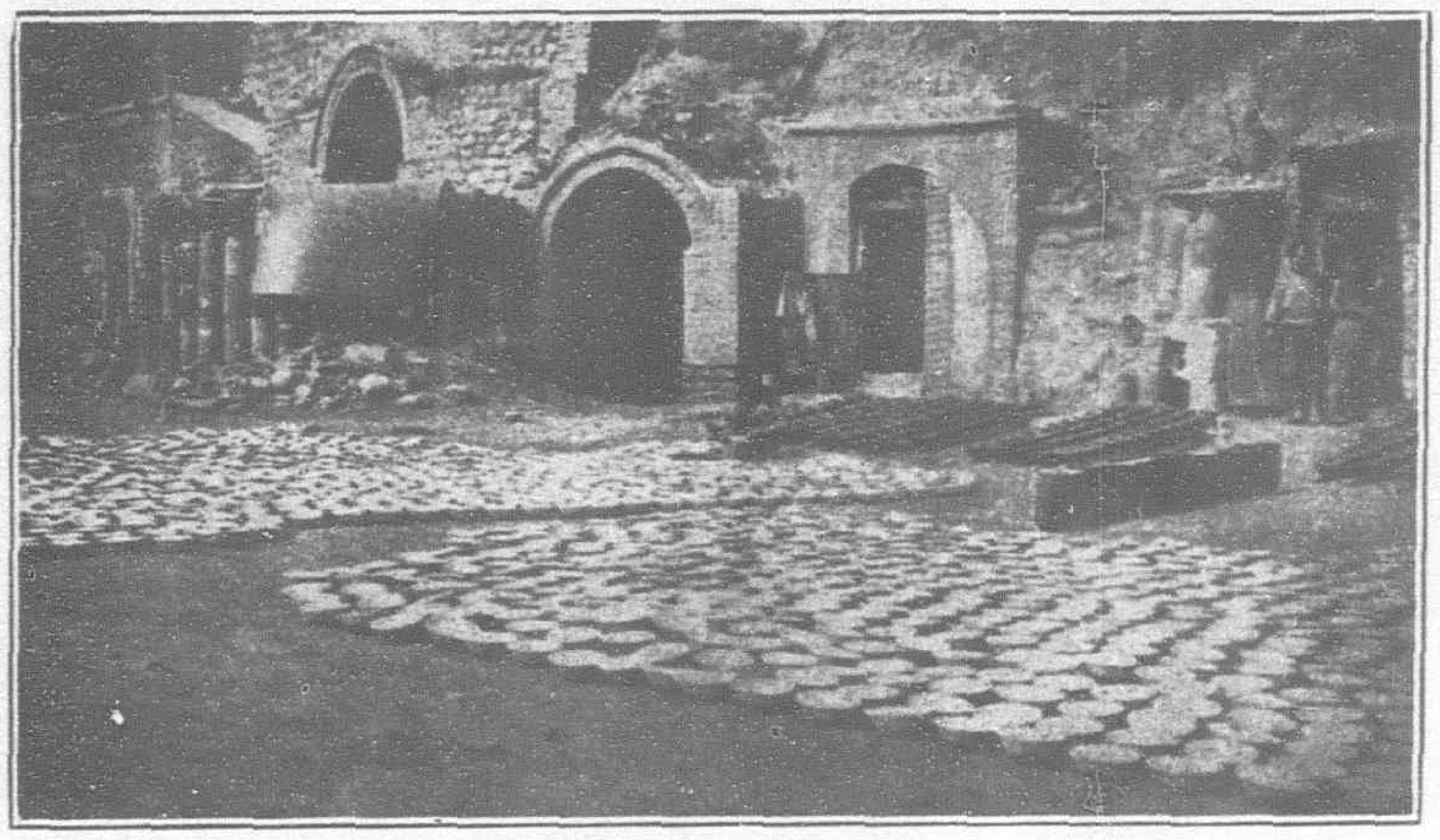


Chinese Pottery Works at Poshan, Shantung

Manchurian Deposits

In addition to the centres mentioned by Mr. Clements, several promising deposits have been located and worked in Manchuria, the most important being located at Fuchou about thirty miles west of the main line of the South Manchuria Railway just outside the limits of the leased territory. The annual export of Fuchou clay amounts to about 70,000 tons, and a considerable amount of this is used by the Ceramic laboratory of the South Manchuria Railway at Dairen, which has established a high reputation for its products and is now exporting china wares to Japan and elesewhere. A plan has been proposed to connect Fuchou with the main line by a narrow gauge railway, which would cost about Y. 1,000,000 or to connect the quarries with the coast only a mile distant. Another promising field producing high-grade porcelain clay in fair quantities and which is now being investigated is located two-thirds of a mile north of Tumenling station on the Kirin-Changchun Railway.

Another large centre is located at Poshan in Shantung where potteries have been at work for centuries.



Making Rice Bowls

Chinese Pottery Works

America's Best Opportunity

“IT is in China, not in Europe, or a possibly reorganized Russia that the greatest chances for American business lie. But at this moment conditions are distressing.” Such is the opinion of a growing group of experienced Americans of whom the speaker quoted is among the most distinguished and the best informed.

W. F. Carey, famous in the Far East as a railway and canal builder, is an American pioneer of trade, and, more particularly, is an unobtrusive but widely recognized expert with regard to Chinese affairs.

Greatly to his surprise, Mr. Carey was recently elected president of the world-famous American organization known as the China society, the organization *par excellence* which links the great struggling republic, Americans, business and professional, who see the need of trade and friendship in the Far East generally, but especially in China, holding that there lie especially promising opportunities for the investment of American thought, money and enterprise.

Mr. Carey's knowledge of China is essentially that of the American of the constructive mind. He has studied the great land and people from the practical viewpoint.

‘ The very simple and impressive reason that to-day China offers the best opportunities for America and Americans to be found anywhere in the world,” Mr. Carey went on, makes the presidency of the China society a big job for a man who realizes what the possibilities of co-operation between America and China are.

“ The time never will come when Europe can offer us such splendid chances; the time may come when Russia may, but it will not come soon. China's offering is now.

“ Everything that China has is open to Americans, including those basic things which will give access to all others—transportations and communications.

“ The people are there, the soil is there; and it is fertile soil; nothing is needed but the building of railways and for these the opportunities are so great that many thousands of miles might be constructed without running the slightest risk of building lines for which there would not be sufficient business.

If Americans do not build China's railways, making the vast profits they will yield, Europeans will.

W. F. CAREY

Famous as one of America's Foremost Railway Builders, and as head of the Siems-Carey Railway and Canal Company, holding contracts for the Construction of 1,100 miles of Chinese Railways and the Improvement of the Grand Canal, has been elected president of the distinguished American organization known as the China Society.

Engineering Notes from Korea

Electrical and Railway Developments

ABOUT forty towns in Korea are now equipped with electric light and power plants. With the growth of industry the number of applications for licenses to erect power houses has increased. Since the beginning of this year the following licenses have been granted :—

Name of company.	Purpose.	Promoter.	Capital.
Anshu Denki K.K. ..	Light	Utaka Yoshida	Y. 50,000
Keishu Denki K.K...	Light & Power	Saiichi Murakami	120,000
Yuki Denki K.K. ..	,, ,, ,,	Cho Otomo	200,000
Joshin Denki K.K. ..	,, ,, ,,	Sanei Kitagawa	100,000
Shari-in Denki K.K. .	,, ,, ,,	Taiko Denki	—

Besides these companies, it is known that the Keishun electric railway and the Kongosan electric railway will both shortly be opened to business. The electric bureau of the communications department of the Korean government will undertake to obtain loans at low interest for new electric enterprises in need of funds.

Railway Development

The survey of the new government railway line between Taicho and Shimpo has been completed and the bureau of communications will shortly invite public tenders for its construction. The total track between Taicho and Shimpo will be 32 miles. Between Kanko and Taicho, the Kankyo line, is now completed to a distance of 23 miles. When the line is completed 55 miles of track will be in operation.

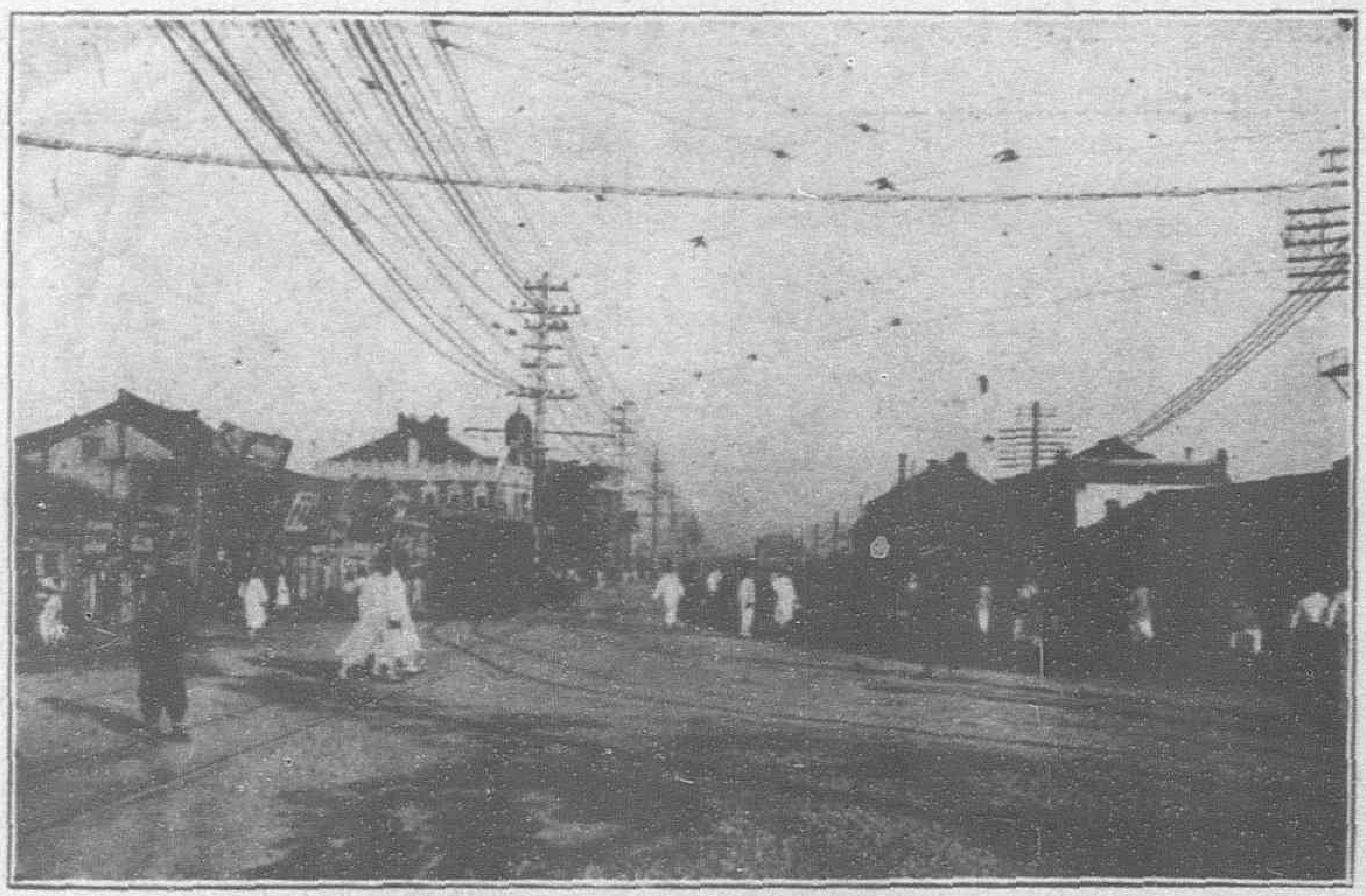
Electrification of line postponed.

Keijo-Jinsen line not to be changed.

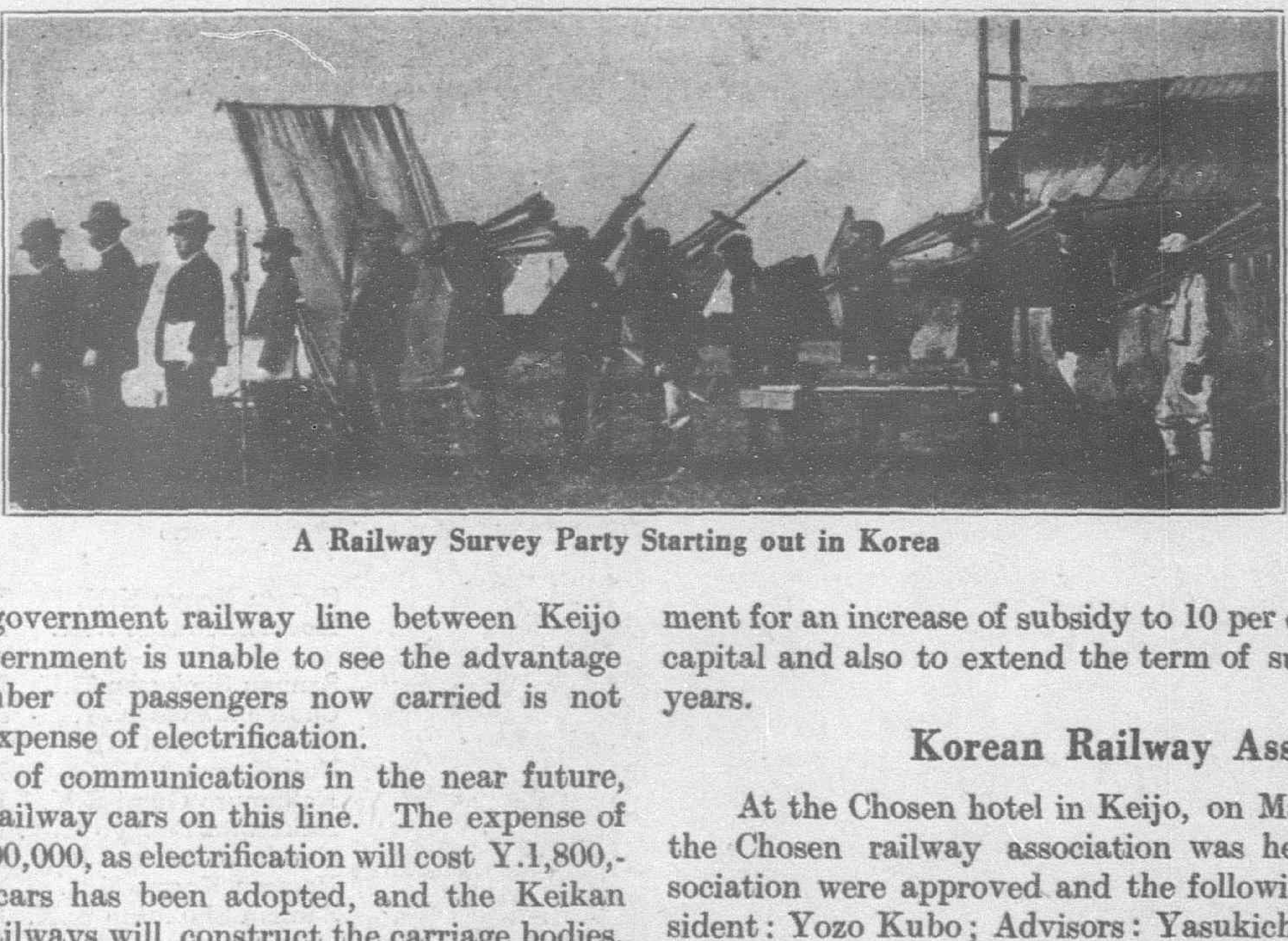
Much agitation has been going on about the electrification of the government railway line between Keijo and Jinsen. But the government is unable to see the advantage of the change as the number of passengers now carried is not sufficient to justify the expense of electrification.

However, the bureau of communications in the near future, will operate automotive railway cars on this line. The expense of these cars will be only Y.300,000, as electrification will cost Y.1,800,000. The design of the cars has been adopted, and the Keikan workshop of the Chosen railways will construct the carriage bodies, while the machine parts will be made in Japan. These cars will be in operation this autumn.

The survey of the line of the Minami Chosen Tetsudo K.K., in the eastern, districts is making rapid progress. It is reported that the section through the Ryutan pass will be the most difficult to construct. Purchase of the right of way will be begun shortly, and construction in some parts will be inaugurated this month.



The Electric Tramway of Seoul



A Railway Survey Party Starting out in Korea

The Keinan Tetsudo K.K. has completed the first part of its program of construction. Stations on the line are almost completed and the erection of locomotives and carriages is finished.

The railway planned to run between Shingishu and Tashijima, called the Okorinko Railway, will be constructed by private capital. An investigation has been completed into the practicability of the line, and the application for a license will be made shortly. Estimating cost of construction Y. 100,000 a mile, the total cost for the 21 miles planned will be Y. 2,100,000. The company will, therefore, have to be capitalized at Y. 5,000,000 to Y. 7,000,000. If only one-fourth is paid up, as is usual, the authorized capital will probably be Y. 10,000,000 to Y. 15,000,000. As soon as the license to construct is granted, the capital will be forthcoming, as all arrangements with the people of the districts traversed have been made, and the line is very welcome.

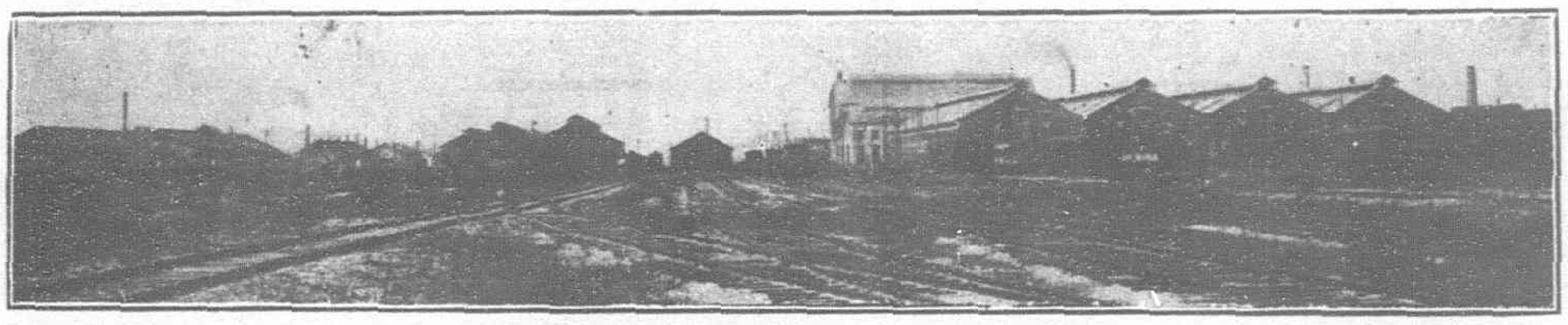
There are eight private railway companies in Chosen today, which receive 8 per cent. subsidy on their paid-up capital from the government. However, only four of these companies have started operating and one of them even has done nothing at all since the license was granted. The total cost of constructing these eight lines will total Y. 70,000,000. The government will not increase its present subsidy of Y.2,500,000 a year, no matter what pressure is placed upon it and under these circumstances railway officials declare that it will be impossible to operate. Consequently, these four companies have not been pushing construction.

The Keinan Railway and the other seven companies have applied to the government for an increase of subsidy to 10 per cent. a year on the paid-up capital and also to extend the term of subsidy from ten to fifteen years.

Korean Railway Association

At the Chosen hotel in Keijo, on May 10, the first meeting of the Chosen railway association was held. The rules of the association were approved and the following officials elected : President : Yozo Kubo ; Advisors : Yasukichi Nishimur, Koraro Yuge, Shunkichi Minobe and Mitsutoyo Ariga ; Honorary Members : Rentaro Mizuno, Isaburo Yamagata, Ryutaro Nomura, Koi Furuichi, Gonpei Oya, Eiichi Shibusawa, Senkichiro Hayakawa, Eizo Ishizukz and R. Kanyo.

LOCOMOTIVES ON KOREAN RAILWAYS.—The Chosen railways (government) are operating 288 locomotives. Of this number 102 are used for passenger trains only, of which twelve are of the most



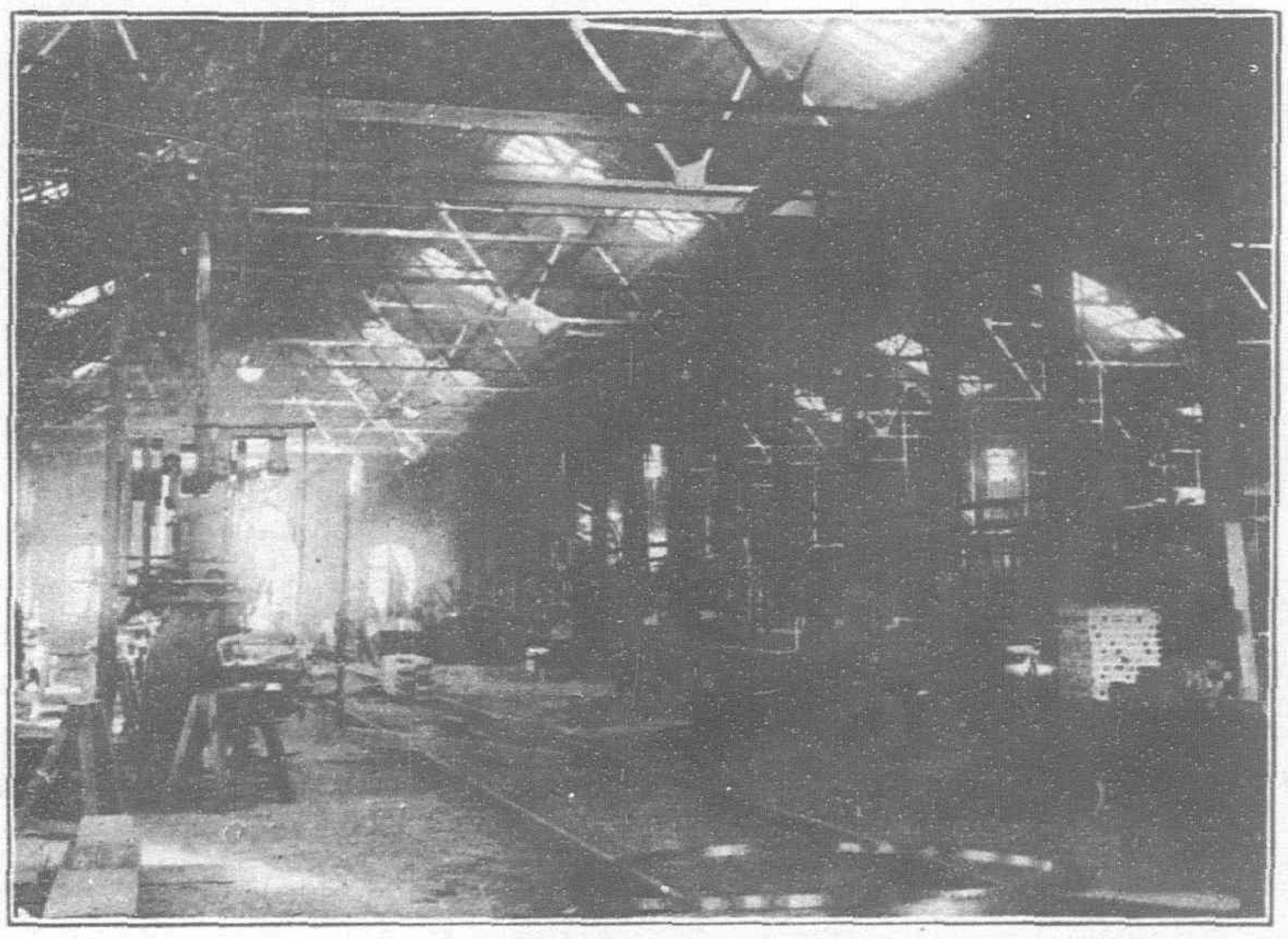
S.M.R. Workshops, Ryuzan, Korea

S.M.R. Workshops, Fusan, Korea

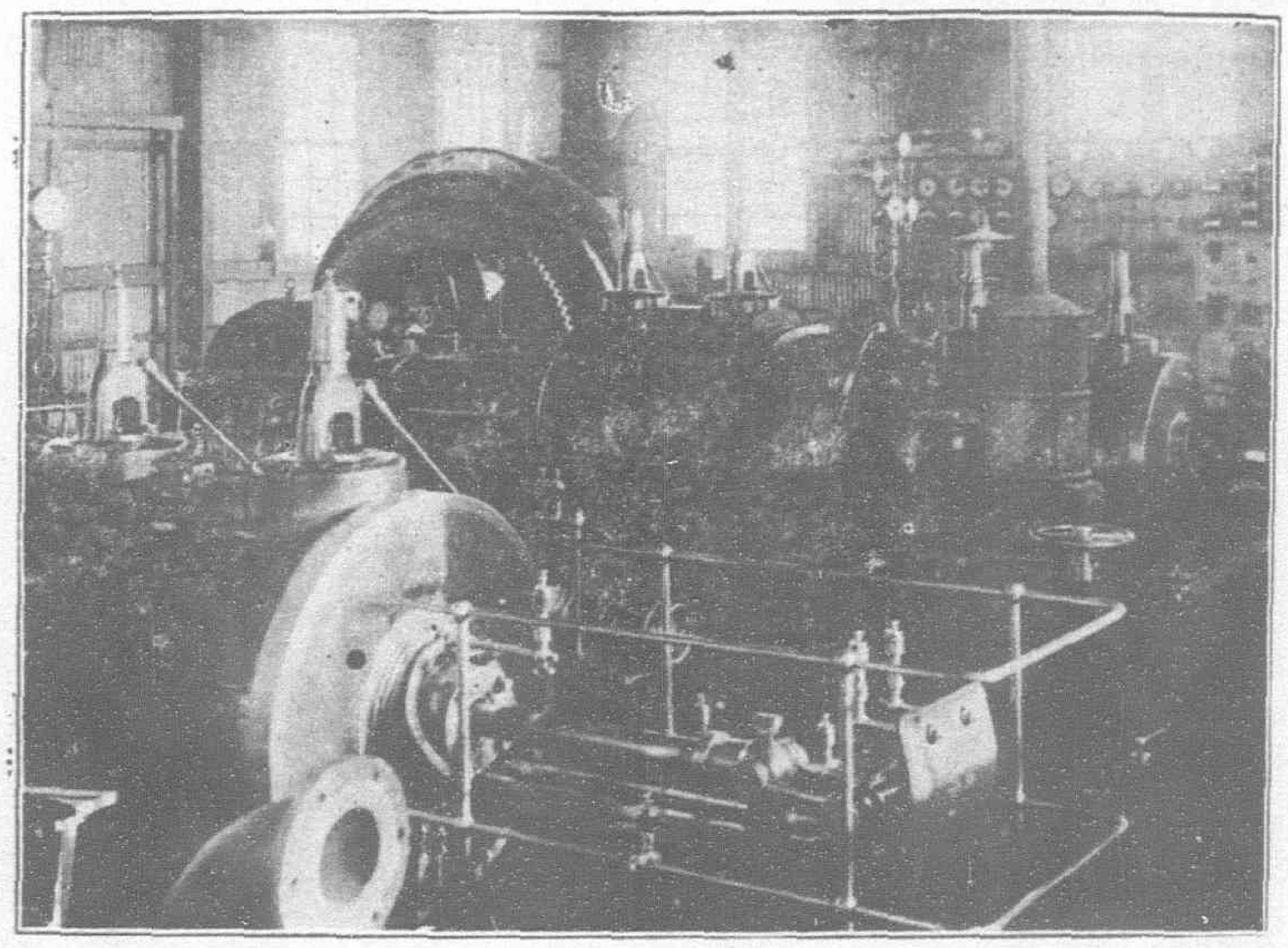
powerful "Pacific" type. Because of the inconvenience of using more than one locomotive on trains on the main line the railway bureau will purchase twelve more "Pacific" type locomotives during the present fiscal year, 1922-1923.

KOREAN MANUFACTURING STATISTICS, 1920.—The Chosen government general has just published the figures for industrial production in 1920. The total number of articles manufactured (including raw silk) was 190, valued at Y. 234,145,587. Articles produced by Japanese were worth Y. 70,865,295, or 36 per cent. of the total. Production by foreigners amounted to Y. 898,130, or 4 per cent., and the balance of Y. 159,693,162, or 70 per cent., was entirely produced by Koreans.

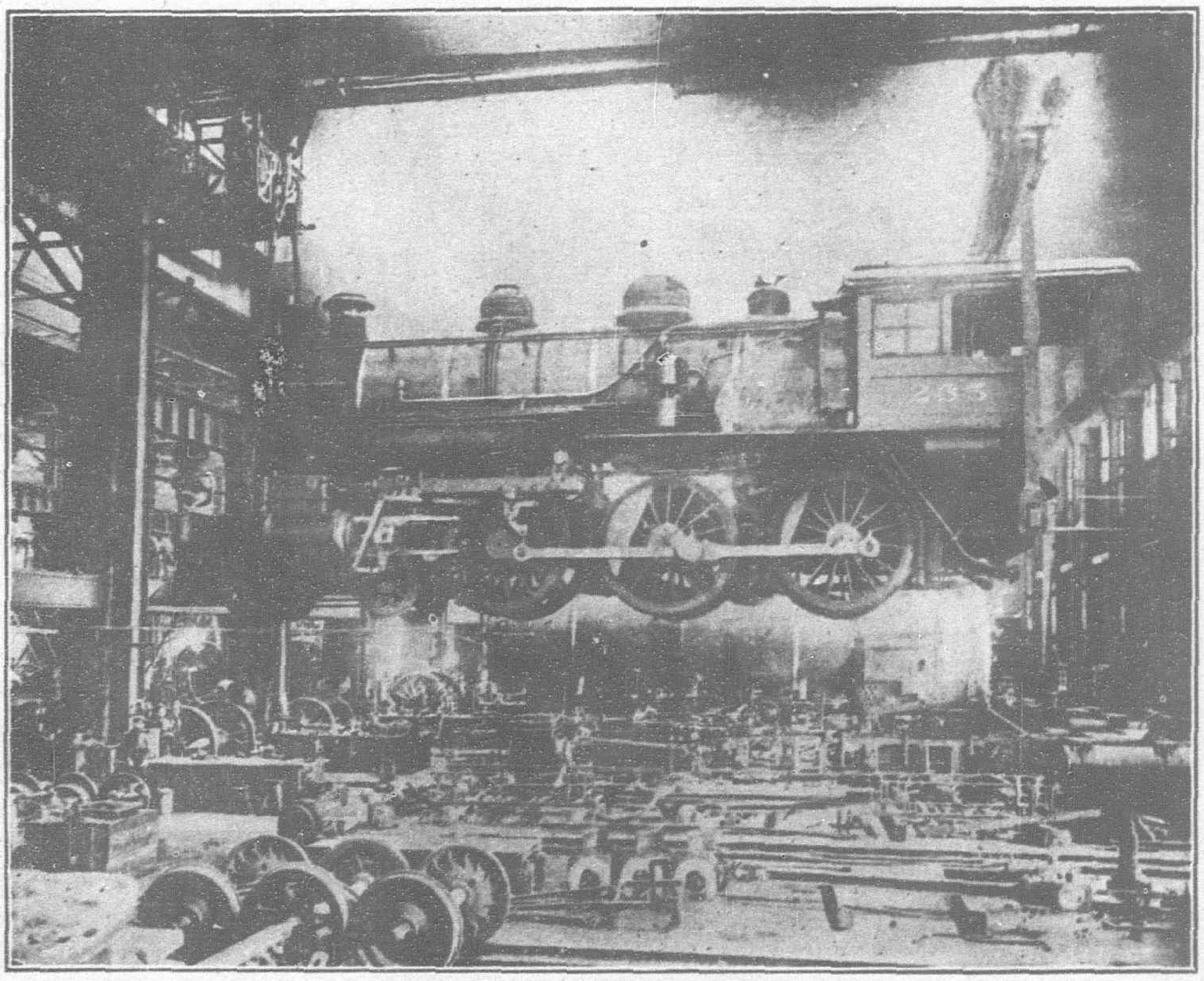
There are 34 joint stock companies (Kabushiki Kaisha), 7 Goshi Kaisha (Limited Partnerships), and 4 Gomei Kaisha (Unlimited Partnerships), engaged in agricultural production in Chosen. Their total capitalization amounts to Y. 33,009,000, of which Y. 20,980,100 is fully paid up.



S.M.R. Ryuzan Workshops, Boiler Shop



Engine Room



S.M.R. Ryuzan Workshops, Korea

All these companies capitalized at more than Y. 500,000 are given in the following table:—

Name	Address	Paid-up Capital *Yen*
Chosen Nogyo K.K.	Keijo	150,000
Koeki Shokusan K.K.	Seishu, Shusei Hokusho	1,000,000
Sannan Shokusan K.K.	Rinzan, Chusei Nando	280,000
Chosen Menka K.K. (Raw Cotton)	Mokuho	1,325,000
Fuji Kogyo K.K.	Keijo	2,200,000
Nakamura Gumi K.K.	Keijo	6,000,000
Nakashiba Sangyo K.K.	Kintei, Zenra Hokudo	500,000
Namboku Mengyo K.K.	Keijo	500,000
Namsen Kogyo K.K.	Koshu, Chusei Nando	125,000
Zannan Shokusan K.K.	Koshu, Zenra Nando	2,000,000
Chosen Nogyo K.K.	Karatsu, Chusei Nando	250,000
Fukudo Noji K.K.	Mokuho	500,000
Koryoku Nojo K.K.	Kanpei, Zenra Nando	300,000
Chosen Moji K.K.	Daido, Heian Nando	125,000
Shinmin Koshi	Keijo	125,000
Mizuhi Mojo K.K.	Teishu, Heian Hokushu	750,000
Ohashi Nojo K.K.	Ekizan, Zenra Hokudo	1,500,000
Kokai Sha K.K.	Keijo	262,500
Tomita Goshi K.K.	Chinnampo	500,000
Kunitake Nojo K.K.	Mokuho	650,000

Coal Resources of Karafuto

(JAPANESE SAGHALIEN)

THE principal industry of Karafuto in the past was fishing, at present it is wood pulp making; in the near future it will be coal mining.

The general development of industry in Karafuto has not been remarkable; at the end of 1920, the value of all products for the year was officially reported at only Y.45,841,299, the greater part of which represented pulp and marine products:

Pulp	Y.21,952,830
Marine products	10,720,691
Timber and Lumber	8,497,194
Metals and Minerals	3,360,034
Agricultural products	1,061,297
Dairy products	249,246
Total	Y.45,841,299

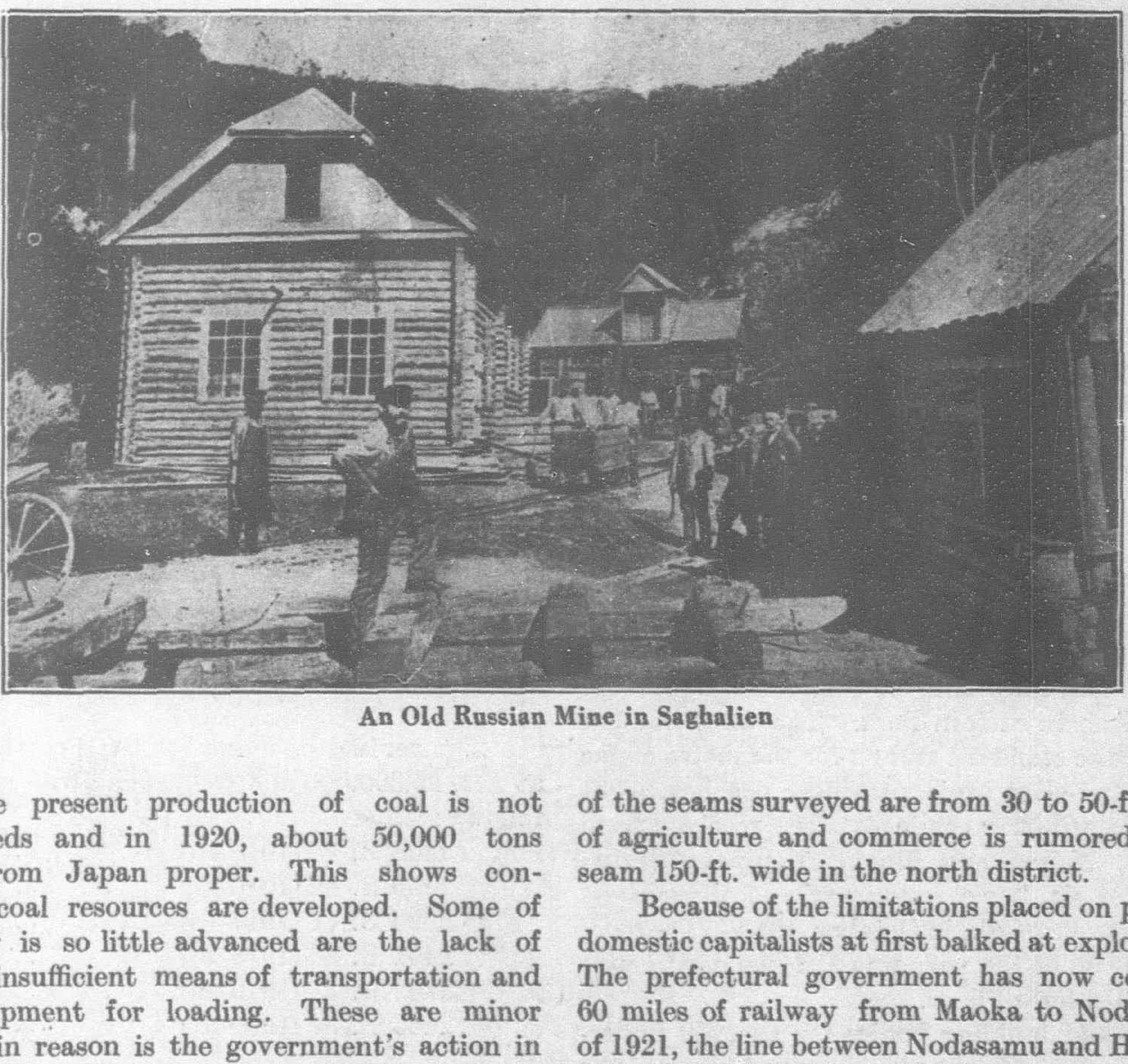
The mineral production was all coal.

From 1912, the production of coal in Karafuto has been increasing steadily:

1912, 415 tons; 1913, 83; 1914, 14,653; 1915, 27,626; 1916, 37,060; 1917, 57,830; 1918, 104,695; 1919, 135,427; 1920, 154,292.

At present, the only mines in operation are the Mitsui mine at Kawakami, in Toyohara Gun; the Karafuto Kogyo K.K. mine at Osakaye in Tomari Gun and also operated by this company on contract at Tomari in Tomari Gun; the Karafuto Tanko K.K. mine at Higashi Shiroura in Sakaehama Gun; and the Noboriko Tanko K.K. mine in Mototomari Gun. These mines produced in 1920: Kawakami, 1,114 tons; Noboriko, 39,964; Osakaye, 34,130; Tomari, 22,244; Higashi Shiroura Mines, 6,840; Total, 154,292 tons.

Besides these, there is also the Noda Samu Tanko K.K.'s mine which in 1917 produced 27 tons and 489 tons in 1918, but is now abandoned.



An Old Russian Mine in Saghalien

Despite the slow development of industry in Karafuto the present production of coal is not enough for the local needs and in 1920, about 50,000 tons had to be purchased from Japan proper. This shows conclusively how little the coal resources are developed. Some of the reasons the industry is so little advanced are the lack of railway communication, insufficient means of transportation and no effective harbor equipment for loading. These are minor reasons, however, the main reason is the government's action in nationalizing the main coal districts and closing them to private exploitation. The government justifies this action by pointing to the wasteful mining methods employed by small mine owners whose operations are usually speculative. The Karafuto coal deposits have always been considered too valuable to permit them to be exploited for individual profit and from the very first the government took the stand that they should be held as a reserve and for colonization development only. The intention has been to open the mine fields as industry developed and then only by the most modern mining methods.

The coal fields now closed to private exploitation include 500 sq. miles in the north, 150 sq. miles in the central and 500 sq. miles in the south, in all 1,150 sq. miles. In these districts there are many parts which have not yet even been surveyed. In the north only 85 sq. miles have been surveyed, in the central part, only 12½sq. miles and in the south 15 sq. miles, in all 112½ sq. miles.

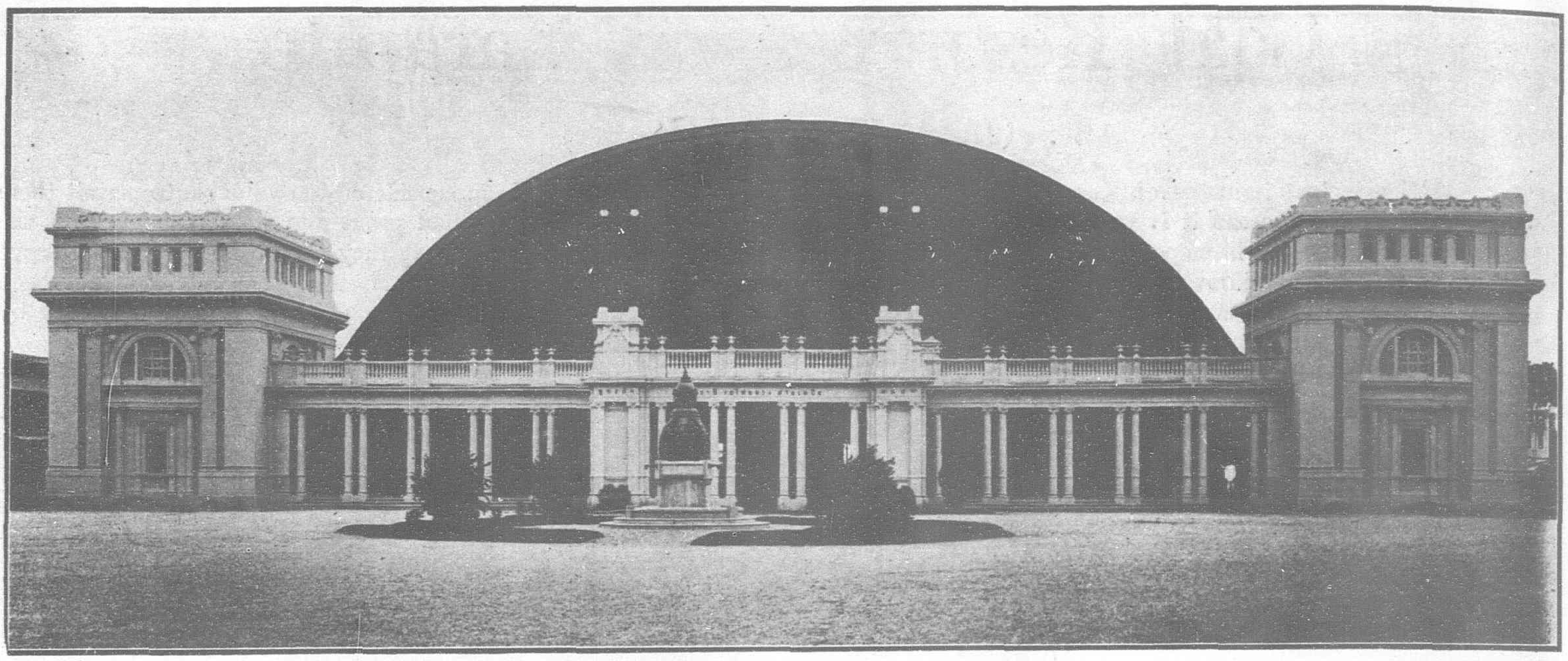
The Karafuto Kogyo's leased mine in Tomari is in the central part. This mine is government property. Despite the large area included in the government enclosure, there are still many very promising mine fields located on the outside. Coal mining in Japan has reached the limit of its development and Japanese coal miners are beginning to turn their attention to Karafuto in search of new fields to open.

Among those seeking for mining rights in Karafuto are the Mitsui Bussan K.K., the Furukawa Mining Co., the Mitsubishi Mining Co. and the Okura Co. At the end of December, 1921, these companies petitioned the government for licenses to mine in 1,112 different places outside the restricted areas.

Applications for licenses to mine, gold, silver, copper and to bore for petroleum amounted to 10 per cent. of this total. More than 1,000 applications were for coal. Most of these prospects are along the western coast of the Japanese territory.

Saghalien coal is particularly valuable in the manufacture of coke. Japan is lacking in good coke-making coal. According to reports there is an enormous quantity of this coal available. One company says that there are about 100,000,000 tons of coal in prospect in one sq. mile of their surveyed land. Some of the seams surveyed are from 30 to 50-ft. wide. The department of agriculture and commerce is rumored to have discovered one seam 150-ft. wide in the north district.

Because of the limitations placed on production by the climate, domestic capitalists at first balked at exploiting the Karafuto mines. The prefectural government has now completed construction of 60 miles of railway from Maoka to Nodasamu and from the end of 1921, the line between Nodasamu and Hisaharu has been doubled. More than Y.4,950,000 has been spent on Odomari harbor, Y.2,950,000 on Maoka harbor, and Y.2,500,000 on Honto harbor. These will be ice-free ports when construction is completed and thereafter export will be materially assisted.



Bangkok Terminus of the Royal State Railways of Siam

Siamese State Railways

THE 24th annual report of the Siamese State Railways for the year ending March 31st, 1921, shows a decrease in the gross receipts for the standard gauge lines of Tcs. 5,787,090, a decrease of Tcs. 544,263 or 8.60 per cent. under the former year, attributed to general trade depression. The working expenses were Tcs. 2,748,502 or 47.49 per cent. of the gross receipts. The net dividend after making due contribution to the renovation fund was 4.51 per cent. on the capital outlay of Tcs. 60,602,610, compared with 5.71 for the previous year. The total length of standard gauge line remains 950.5 kilometres.

The metre gauge lines (1,302 kilometres opened to traffic) have a capital account of Tcs. 64.453,190 or 50,871 per kilometre. The gross earnings were Tcs. 3,864,369 as compared with 3,926,589 the previous year, a drop of Tcs. 62,220 or 1.58 per cent. The working expenses were 2,259,916 an increase of 7.43 per cent. over the previous year, and 58.40 per cent. on the gross receipts. After deducting 322,266 for the renovation fund, the net profit was 1,215,187 or 1.58 per cent. on the capital.

Rolling Stock

During the year the remaining 18 locomotives out of the 25 ordered from the North British Locomotive Company were delivered and 17 placed on the southern lines and the remaining eight kept ready for the eastern and north-eastern lines. The total number of locomotives were 62 for the standard and 62 for the metre gauge lines. Eight first and second-class bogie passenger coaches, eight bogie vans and four bogie third-class carriages were received from the Metropolitan Carriage, Wagon and Finance Company during the year, while an order for six bogie restaurant and three bogie sleepers was placed with Cravens, Ltd., in October. 1920. The total number of carriages at the end of the year was 193 standard gauge and 119 metre gauge, or 312 for all lines.

The work of erecting and building bodies for the 200 underframes for the metre gauge goods wagons received during the year from the Metropolitan Carriage, Wagon and Finance Company, Ltd., was carried on. Other goods rolling stock was received from Baume et Marpent and the Midland Railway Carriage and Wagon Co., Ltd. The total number of goods wagons in service at the end fo the year was 891 standard gauge and 787 for the metre gauge.

Distributing channels take off from the main canal and the two branch canals, and from these again minor channels and water courses deliver the water on to the individual cultivator's fields. The main canal, the western branch canal and the system of distributing channels connected with these are nearing completion, and actual irrigation from them will commence for the rice crop of 2465 B.E.

The area to be protected annually by direct irrigation is estimated at 100,000 hectares, or 625,000 *rai*. Furthermore by linking up the new system with the old communication canals and creeks to the southward of Ghlong Hok Wah Sai Lang and utilizing the surplus water of the Menam Nakonayok, a copious flow of fresh water will be provided for the great and fertile, though low-lying plain, bounded by the Rangsit area on the north, the Menam Chao Phya on the east and the sea on the south. This water which will replace the noxious saline fluid, inimical to plant and animal life, that now stands in the canals and creeks of this area for a great part of each year, will supply irrigation of the kind known as indirect, or flood irrigation, consisting of the alternate flooding and draining of the land by one and the same set of channels according as desired. Thus in addition to the area directly affected, a very large tract will be indirectly benefitted by the system. It is to be noted that to obtain the best results in rice cultivation an efficient drainage system is practically as important as the supply of water.

The revised estimate for the Prasak project at present stands at Tcs. 13,300,000 and the expenditure up to March 31st 2463 is as follows :

2458 B. E. (1915-16)	Ticals	388,402*
2459 B. E. (1916-17)	,,	1,273,559
2460 B. E. (1917-18)	,,	1,664,015
2461 B. E. (1918-19)	,,	2,655,382
2462 B. E. (1919-20)	,,	2,495,812
2463 B. E. (1920-21)	,,	3,884,289
Total ..	Ticals	12,361,459

*Includes expenditure on other projects Tcl. 238,815.24.

Of the above sum Tcs. 2,000,000 has been expended on machinery, stores and plant which will be available for use on other projects if sanctioned.

At the present time the Siamese State Railways are composed of two different gauges, namely, standard gauge (4-ft. 8½-in.) on the east side of the Menam Chao Phya and metre gauge on the west side. Arrangements are being made to convert the entire system to metre gauge, and already a third rail has been laid on over 150 kilometres of the standard gauge lines, from Bangkok to Petriu and from Bangkok to Ban Phaji. The reasons for altering the gauge are paltry, in order to standardize the rolling stock, thereby effecting a considerable economy in spares and stores, and partly in order to render the entire system the same gauge as those of the Burma, French Indo-China and Federated Malay States Railways, with a view to making it possible at a future date to run through trains between all of the principal cities of South Eastern Asia.

The state railways were at one time to all intents and purposes organized as two separate railways. They remained so until July, 1917, when for a economic reasons the two railway system were amalgamated under the present commissioner general, H.R.H. Purachatra, the prince of Kambaeng Bejra.

The construction of the standard gauge state railways commenced in 1892 and the line from Bangkok to Ayudhya (71 kilometres) was opened in 1897. Since that time the line has been extended to Korat a distance of 264 kilometres. The northern line branches off from this line at Ban Phaji junction (kilometre 90) and from that point to Chiengmai the line is open to traffic, a total distance of 756 kilometres, from Bangkok, the last section from Pang Yang to Chiengmab having been opened to traffic on 1st January, 1922. A short line (69 kilometres) runs due west from Ban Dara junction, rotation on the northern line, to Sawankaloke. The eastern line running from Bangkok to Petriu (63 kilometres) was opened in 1908. The river line (6.5 kilometres) connects Makasan on the eastern line with the railway wharf on the Menam Chao Phya. The total length of all the standard gauge lines open to traffic is 1,025 kilometres.

In 1909 a second railway department was formed to build railways in the peninsula. This line known as the southern line is a continuation of the metre gauge line from Bangkok Noi to Petchaburi (150 kilometres), which was opened in 1903. From Petchaburi the line runs almost due south, passing through Prachuab Kirikan (Koh Lak), Bang Sapan, Chumpon, Lang Suan, Surashtra Dhani (Bandon) to Tung Song, where there are two branch lines, namely, the Nakon branch, and the port of Kantang branch. From Tung Song, the southern main line runs to Perlis boundary via Patalnug and Haadyai junction, joining up with the Federated Malay States Railways at Padang Besar, and the eastern branch of the southern main line, branching off at Haadyai and running through Mondhol Patani, joins up with the F.M.S. railways at Sungei Ghok on the Kelantan border. There is also a branch line to Singorol from Haadyai through Ootapao.

The through service between Bangkok and Penang was opened in July, 1918, three days being necessary for the trip, but since January 1st, 1922, arrangements have been made to operate a sleeping car service between the two points and reduce the running time to 36 hours. With the exception of some minor works the whole of southern line is now completed, the last section on the Patani branch from Balaw to Sungei Golok having been opened to traffic on 1st November, 1921.

The government has scheduled large extensions and many important works for completion during the next few years. Among the most important of these is the bridge over the Menam Chao Phya at Bangkok, which will join the two sections of the state railways after the gauge has been standardized into metre gauge. The administration will benefit by this measure considerably, being able to obtain an effective control for traffic purposes over the whole network of state railways, and to effect through running, not only over the whole Siamese system, but, by arrangement, through passenger and goods traffic into the neighboring states.

The proposed extensions comprise over 500 kilometres of new line, included in which are a line from Petriu to Aranya Pradesa a point within a few kilometres of the Cambodian border, and the north-eastern line from Korat to Ubol.

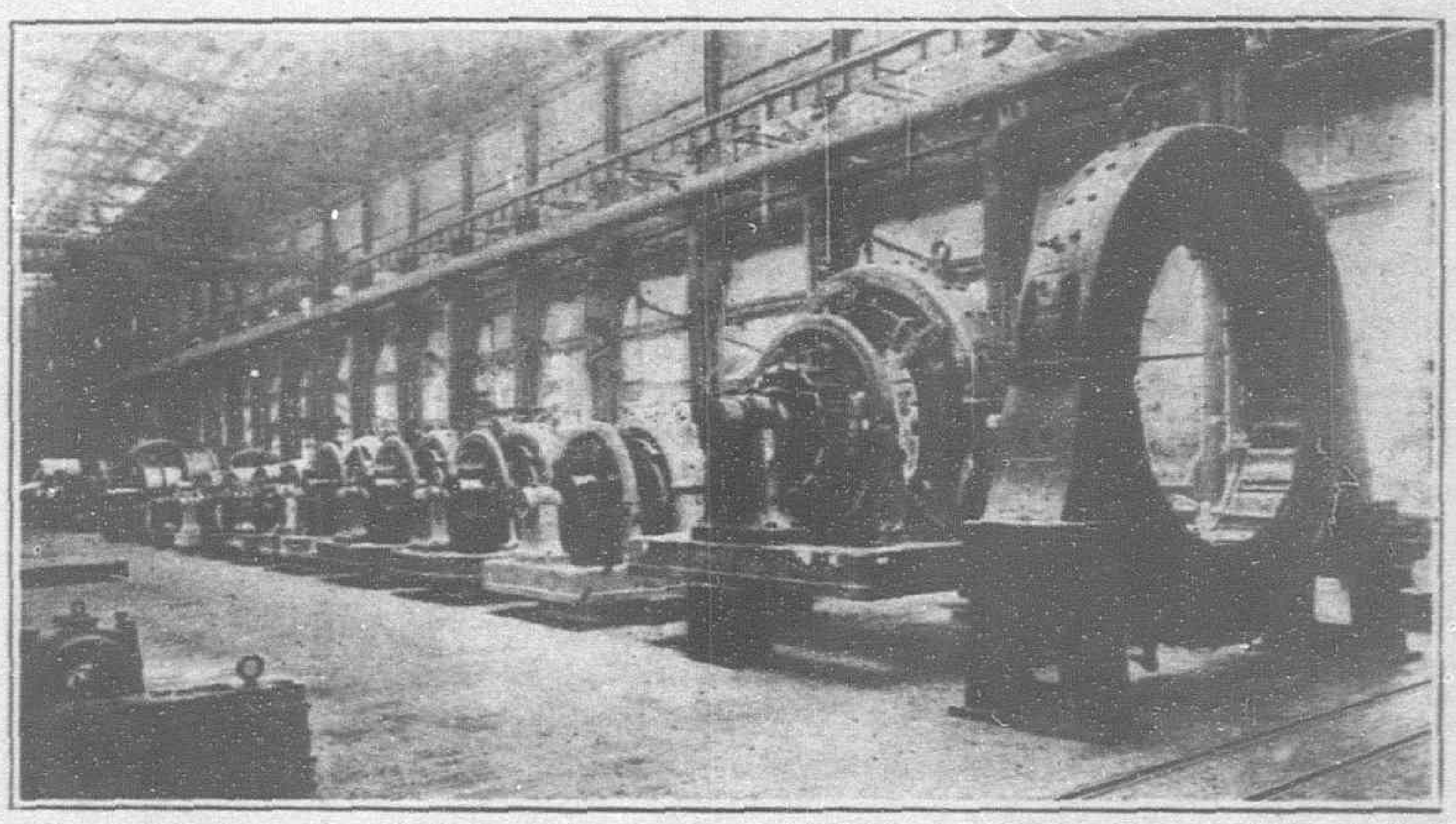
By far the most important event in the history of railway organization in Siam was the promulgation on 15th August, 1921, of a law on organization of railways and highways. The law establishes the department of state railways on a sound administrative and commercial basis, providing for the safety of the lives and property of the traveling public, facilitating consignment of goods, a fair and just method for the acquisition of land, and an effective control of private and industrial railways.

The measure of putting the roads and other highways in the provinces under the railway administration has been well adapted to the present peculiar needs in a country where roads as known in other countries do not exist outside the towns. Opportunity has now been given to devise and organize a comprehensive transport scheme, wherein roads will serve as feeders to the railways at important trading centres, and to augment the roadways and waterways where necessary, that is to say, where traffic justifies transport by road in addition to waterways and railways.

The private lines open to traffic amount to 106 kilometres.

English Electric Company

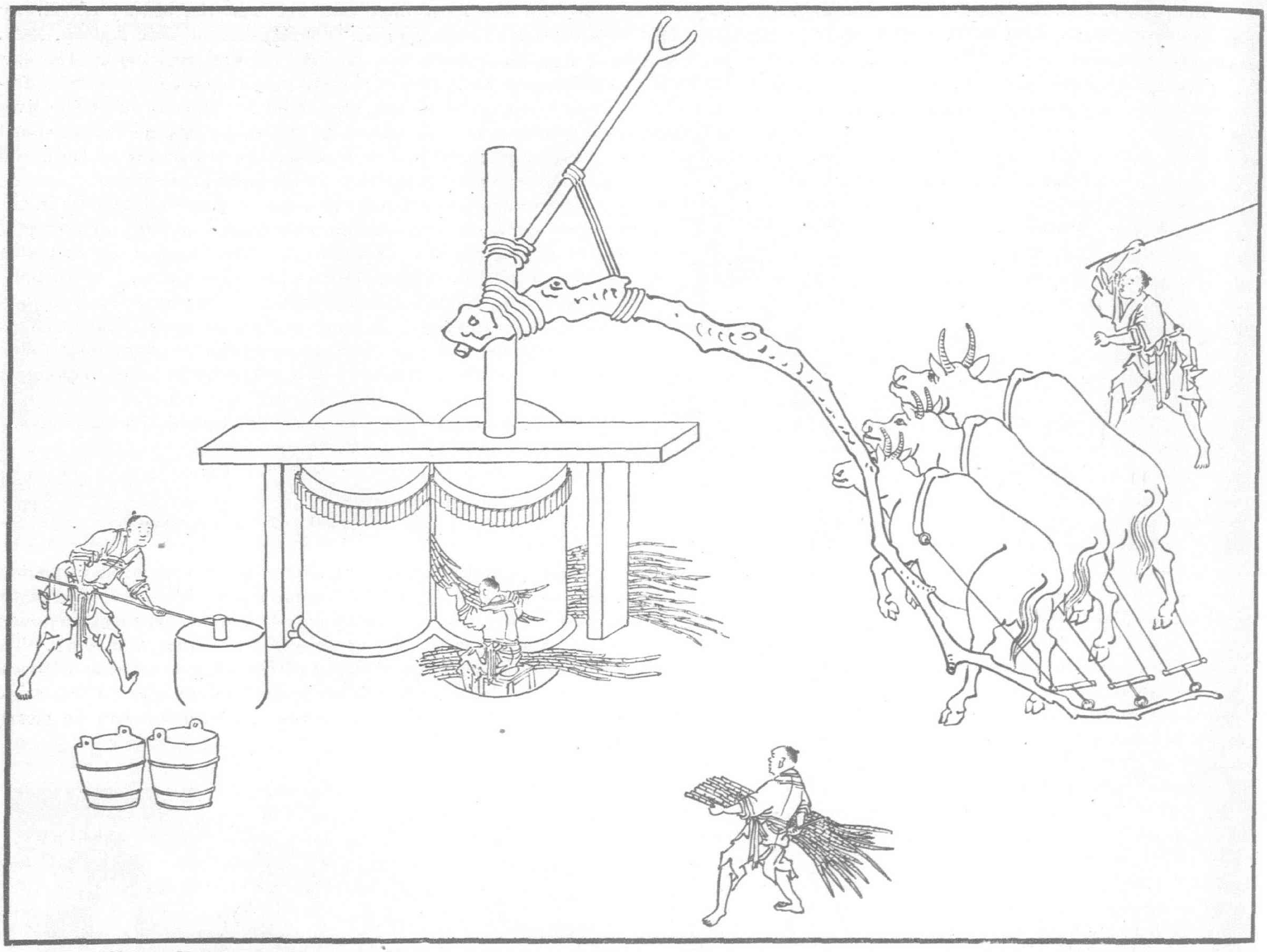
The illustration shows a number of rotary converters in various stages of construction. The frame on the right-hand side of the picture belongs to a very heavy current low voltage machine designed to give a direct current supply for rolling mill work. The armature belonging to it may be seen at the extreme left-hand side of the picture. This is designed to carry about 6,000 amps. and the special double-commutator construction can be clearly seen.



Next to the frame of this machine are a number of parts of 1,500 KW. machine for municipal service, designed to run at 42 R.P.M. and still proceeding to the left, we have machines of 1,100 KW., 1,000 KW., 500 KW. 250 KW., and 200 KW.

In addition to the above, four or five more machines were running on the test bed at the time, varying in output from 1,500 KW. down to 200 KW., and the modifications in design between the largest and the smallest sizes of some 15 machines dependent upon the conditions of service and the frequency of the alternating current supply form a most interesting and attractive study.

We understand that the English Electric Company intend to build all their rotary converters for industrial or municipal service at the Siemens Works, Stafford, which are exceptionally well laid out to deal with a wide range of machines, suitable for the varying conditions of periodicity and voltage met with in general municipal and industrial service. Another part of the same works is devoted to the manufacture of the whole of the A.C. and D.C. switchgear necessary to control the rotary converters, while the step-down transformers for working in conjunction with the converters are manufactured by the same company at their Coventry Works, so that the English Electric Company are in a position to furnish the entire equipment of a rotary converter sub-station from the products of their own factories.



Chinese Native Sugar Press; 450,000 tons of Sugar are extracted annually by thousands of these stone mills turned by Buffaloes

The Cane Sugar Industry of China

EDITORIAL FOREWORD. The project for the erection of a $5,000,000 sugar refinery in the vicinity of Shanghai invites attention to the state of an industry, which, like all things Chinese, rests its fame on past performances. With a domestic production estimated at 450,000 tons of open kettle sugars, and imports of 350,000 tons, the annual consumption may be placed at 800,000 tons, a per capital consumption of about four pounds annually, a market which any other government but that of China would make some serious attempt to preserve and develop for a home industry.

It seems to be taken for granted that lack of transportation facilities and imposition of *likin* make it impossible for China to ever become a factor in the world's sugar market. If we accept that the provinces of Szechuan, Hunan, Kiangsi and other interior districts are to become the future sugar producers of China, that statement would hold good, but we are of the opinion that any great development of the industry will take place in the provinces of Kwangtung, Kwangsi and the island of Hainan, in districts either on or adjacent to the sea coast, or within easy narrow gauge railway haulage. To our mind, the greatest obstacle to the operation of modern central factories arises from the fact that the land is split up into such small holdings (properties of families and clans handed down for generations) which are difficult to acquire to form an estate and just as difficult to count upon for a guaranteed supply of cane to justify the erection of a central factory. Without this guarantee of cane supply and enforceable laws that will indemnify the factory in the event of failure on the part of the planters to live up to contracts for the supply of cane, the development of the sugar industry along lines which have proved so successful in other countries, is almost impossible.

The likin barrier undoubtedly constitutes one of the greatest obstacles to the development of a home industry operating as it does as a discrimination against the Chinese themselves. Imports from foreign countries pay the five per cent. *ad valorem* duties and are shipped to the interior with a surcharge of 2½ per cent. tax, free of all further *likin* impositions. Chinese-made sugar on the other hand, is taxed at every *likin* barrier, which practically prohibits the export of sugar outside the producing province. Even this, however, would not operate immediately against the establishment of a modern mill, as each province could for some time consume its output.

Some years ago, the great British firm, Jardine, Matheson & Company, operating a sugar refinery at Hongkong, established a branch refinery at Swatow, the heart of the Hankiang cane sugar district, but the native officials and sugar dealers' guild brought pressure to bear upon the planters to restrain them from dealing direct with the foreigner. Unable to secure the necessary raw materials or of enforcing contracts for deliveries, even if entered into, the British firm was finally forced to give up the fight, close the refinery, dismantle the machinery and ship it to Hongkong.

The building and high chimney still stands dominating the port of Swatow, a permanent monument to Chinese obstructionist methods.

In 1913-14, at a time when it looked as though China would settle down under the firm rule of Yuan Shih-kai, the publisher of this magazine endeavored to put some life into the cane sugar industry of South China, and in order to interest foreign capital in erecting central mills, prevailed upon the Chinese government to grant a subsidy to the extent of guaranteeing eight percent on the capital actually invested in such enterprises. The government was also prepared to strengthen the weak point in the central factory system by providing the necessary guarantees that a stipulated amount of cane would be delivered at the mills under an equitable contract between the mill owner and the farmers. In this respect, the old Chinese officials at Peking deserve considerable commendation. They went as far as they could to induce foreign capital to come and have a " look see " at the industry and install an experimental plant somewhere in South China. Financial conditions in the United States and the instability of China's internal affairs however decided those interested in new sugar enterprises to reject the proposition. The war precluded any hope of resurrecting the scheme.

From the following memorandum submitted by the ministry of agriculture and commerce to the president some time during the month of November, 1914, it will be seen that the Chinese authorities made a careful study of conditions surrounding the creation of a modern sugar industry in China and practically adopted the main features of the system which proved so successful in developing the industry in Formosa :—

> " Through want of improvement the sugar industry of this country has been declining all the time, and as shown in the customs return, the import of foreign sugar has increased tremendously, while the export of Chinese sugar has dwindled to nothing. Owing to the European war the colonies of foreign powers where sugar is produced have been affected, and it is certain that in the coming year the world will be in need of sugar. Hence it offers a most important opportunity for the Chinese to improve the manufacture of sugar so as to supply the needs of the world. The Ministry after considerable discussion desires to offer two suggestions for the improvement of the sugar industry, namely, (1) to fix districts, and (2) to institute investigations.
>
> " The cultivation of sugar canes and the manufacture of sugar must depend upon each other. They must be in proportion, and if there are too many sugar factories in one place there will not be sufficient sugar canes for them to manufacture sugar. Therefore when applications are made for the establishment of sugar factories the districts will be fixed according to the capital of the factory. Again with a certain district all sugar canes produced there should be sold to a particular factory, thus it will prevent the raising of prices.
>
> " In almost all foreign countries, the manufacture of sugar is strictly inspected by the authorities, but there is no such thing in China. The sugar merchants of this country have always put some mixture in either red or white sugar so as to make more money without giving any consideration of the injury they have done to their trade. Consequently the people of this country prefer to use foreign sugar though it is more expensive.
>
> With the above corrupt state of things, there will be no success though the government has promulgated a set of regulations encourageing sugar plainting and guaranteeing the interest for the capital of the company. This ministry has made the following proposals : (1) When any person wants to manufacture sugar, he must send an application to the ministry of agriculture and commerce, requesting that the sugar canes produced in a certain district be sold to him for the manufacture, and the material for the manufacture shall be sugar canes or sweet vegetables. (2) After the district has been assigned to any person, no other factories shall be established there. (3) All the sugar manufactured should be subjected to the inspection of the authorities. (4) Those factories which have been established before the promulgation of the present system shall register themselves in the ministry within the 4th year of Min Kuo. If the above plan be carried into effect, the sugar industry will soon be developed.
>
> The President's Reply : The above petition is hereby approved, and the ministry concerned is ordered to put it into effect.

In January of the following year, President Yuan issued a mandate promising that the government would lend to any sugar factory a sum of money equivalent to five percent of its paid up capital, hoping thereby to encourage the formation of native sugar companies. In March of the same year, the minister of agriculture telegraphed to the governors of the southern provinces the offer of the government and urging wealthy people to invest in modern sugar mills in order to supply the home demand. This also failed to produce results. China let a golden chance slip by during the war, and it is hardly probable for some years to come that the central government will be in any position to follow up its sugar development program of 1914, and if guarantees of interest on invested capital is essential to the development of the industry, these subsidies and other aids must emanate from the provincial governments.

The success of a modern cane sugar industry in China will depend largely upon the selection of proper districts, the importation of new seed cane and the erection of suitable mills, under laws that will guarantee the latter from competition and assure to them that the farmers will live up to their contracts to supply the cane. We are of the opinion that it would be extremely difficult to find a district where a 500 ton mill or over could be erected with reasonable prospects of success, and our judgment would be that the Chinese would have to be educated little by little to the use of modern machinery by starting in at the bottom with a cheap and efficient steam mill giving a maximum extraction operating with open trains, and then gradually expanding these mills, by the introduction of evaporating apparatus, centrifugals, etc. Once the Chinese can be shown that the saving in extraction alone will pay for a steam mill in one crop or two, and the foreigner is willing to extend long term credits, an opening can be made. The future of the cane sugar industry therefore depends largely upon education.

We also incline to the belief that the best results would be found somewhere in Kwangsi or on the island of Hainan, for although the Swatow district and other parts of Kwangtung are already devoted to cane cultivation, whenever the pressure of the staple food supply is great, that is, when the price of rice increases, the tendency is to increase the rice acreage.

This tendency is witnessed in Formosa where the industry is under strict government supervision. The same is true in other parts of the Far East. For this reason, we believe that the unsettled districts of Kwangsi province and the island of Hainan offer the most favorable opportunities for the establishmnet of a modern cane sugar industry in China. Because of their geographical situation within the tropics, climatic and soil conditions in these sections would assure a higher sugar content in the cane than would be possible in the Upper Yangtze regions or Fukien. The island of Hainan, situated outside the zone of political disturbances having an area almost as great as that of Formosa and abundance of cheap labor, seems ideally located for the establishment of the industry. A little initiative with ordinary risks coupled with sufficient government protection and, if necessary, subsidies, and the proper selection of a district in close promiximity to deep water, seem all that is needed to build up a profitable home cane sugar industry in China.

Notwithstanding the proverbial business honesty of the Chinese, this trait cannot be said to extend to their preparation of certain commodities for the market. The adulteration of tea lost for them the great tea trade of the world and handed it over to more honest merchants. Similar adulterations of native sugar has driven even the Chinese consumer to purchase the foreign article, and any attempt to build up a modern sugar industry, would have to be done under strict government supervision, especially if an official subsidy, guarantee, or aid of any kind is extended.

Furthermore, we are also of the opinion, that the time is past when the Chinese will consent to foreign capital controlling an industry of such magnitude as the sugar. A couple of years ago, there was much talk of Chinese-American and other foreign cooperation, but as far as we have been able to gather, this talk was all one-sided, emanating from the foreigners and not from the Chinese. Experience has proven that cooperation with the Chinese when it comes down to brass tacks, takes the form of Chinese control of the enterprise, in which they are willing to utilize up to 49 per cent. of foreign capital with foreign technical supervision, pending such time as their own experts can be educated.

In applying this condition to a solution of the cane sugar industry, the best that the foreigner can hope for is a participation in the capital and the profits from selling and installing the machinery, with perhaps a participation in the profits in return for technical supervision. Or, the precedent created in the Philippines might be followed in a modified way, in which the government would contract with a foreign concern for the erection of the plant and its supervision, and at the expiration of a number of years, the plant would revert to an association of native planters who supply the cane.

G. B. R.

* * *

Notes on Cane Sugar in China

The exact date when sugar cane was introduced into China is not known, but from the "Botanical Classification" compiled during the Ming era, and other standard Chinese works, the manufacture of sugar seems to have been introduced amongst the Chinese for the first time during the reign of Emperor Tai Tsung in the Tang dynasty, in the early part of the seventh century. So it may be accepted that the history of sugar in China goes back over a thousand years, and from the state of the industry at the present time it is apparent that it has not progressed one step since it was first started. The methods handed down from their ancestors have been preserved in all their crudeness with the result that the once flourishing industry gradually declined until the greater part of the consumption is now supplied by foreign, and especially Java refined sugar.

Primitive Methods

The methods employed in extracting sugar from the cane are primitive in the extreme. The following description of the process will cover the entire field in China :—

During the harvesting of the sugar cane a number of small rough sheds are erected for the manufacture of the sugar. Outside each shed there is a set of presses, driven by two oxen or buffaloes. Inside are three or four large iron pans, placed over a shallow ditch, which constitute the boilers.

The mill consists of two granite rollers, fixed perpendicularly to a wooden frame. These wheels are turned by a long lever, one end of which is fixed to the upper axle of one of the wheels, and the other connected with the yokes of buffaloes. The animals are driven round in a circle, and small bundles of sugar cane fed between the revolving rollers. The juice flows into a large earthenware receptacle beneath the wooden frame. Any person with ordinary intelligence can work the pressing apparatus, and it is generally managed by the farmer and his family, but a little skill is necessary for boiling the juice, and this is usually done by an expert.

After the juice, previously mixed with a little lime and tung oil (wood oil), is boiled to the required consistency, it is removed from the boilers by a large ladle and put in shallow bamboo pans, where it is left to criptalyze into brown sugar bricks. When the sugar season is over, the sheds are pulled down and all the apparatus removed except the stone rollers. The sheds are erected and fitted up annually.

The places noted for the production are largely in the south where the climate is warm, although a considerable industry is located in Szechuan. The provinces of Kwangtung and Fukien produce about half the estimated production, the greatest producing areas being located in the Hankiang, Lukiang and Kinshi valleys. In olden times, the Canton delta was extensively cultivated to sugar cane, but the ground is now given over largely to orchards and the mulberry tree.

The Hankiang Valley

The Chaochow district of Kwangtung, or the region back of Swatow heads the list in regard to the production of sugar with an area planted to cane estimated at nearly 20,000 acres. The seed is planted early in the spring and harvested in ten or eleven months. It is said that at least three ratoon crops are obtained from the original planting in this district. Bean cake is largely used as a fertilizer and the number of small mills in operation is said to be over 2,000 producing over 1,000,000 piculs a year, or a yield of over three tons to the acre.

The industry in this district reached its high water mark in 1899, after which a steady decline in production and exports set in due to the gradual displacement of the native sugars by imports from Java, Hongkong and Japan. The once great industry of this district met the same fate that befell China's tea trade. Adulteration, poor quality and refusal to install modern machinery lost the home market to sugars from other countries. The taste for the cleaner and cheaper article throughout China was being generally acquired, which was not offset, as was hoped by being used as an ingredient in dyeing silk piece goods. Orange orchards begin to take the place of the cane fields and the industry seemed to be on its last legs when a new demand was created as a result of the war. This however has fallen off and the industry is again at a low ebb.

There are two varieties of cane produced in the district, one reddish in color, 5 to 7 feet tall, and over 1 inch in diameter; the other called the white cane, which is 6 to 8 feet high and 1 inch in diameter. The former in its natural state is popular with the natives, who chew it because of the excellent flavor of the juice; the latter is used for crushing to obtain the sugar that is marketed.

Fukien Regions

In the Lukiang and Kinshi valleys the cultivation of cane is carried on extensively near Chuanchow and Changchow. Here the annual output, estimated at 300,000 piculs finds its market through the port of Amoy.

The prevailing climatic conditions in the district makes it well suited for the production of sugar cane.

But the local production does not begin to meet its requirements in sugar consumption. In fact, sugar is one of the larger items of import into Amoy; the imports of brown, white, and refined sugar during the year from 1914 to 1919 being :

Year.	Brown sugar.		White sugar.		Refined sugar.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.
1914	363	$16,358	6,888	$418,720	1,161	$ 73,037
1915	442	21,445	1,201	91,419	4,140	356,142
1916	66	4,337	3,537	299,874	3,081	339,960
1917	64	4,578	2,027	191,654	1,465	189,660
1918	115	9,257	4,612	550,954	4,197	608,949
1919	246	34,709	2,524	448,628	2,415	536,407

The sources of many of these imports are Singapore and Samarang, while most of the refined sugar reaches Amoy from Hongkong. Amoy is the only port of entry into the district.

The district has a small sugar-candy industry, but here again the imports far exceed the exports. Exports go principally to overseas Chinese in the Philippines, Formosa, the Straits Settlements, and the Dutch East Indies. Imports are mainly of British and Chinese (Shanghai) manufacture.

Accurate statistics regarding the area in the district planted in sugar cane are totally lacking. According to a consular report a fair valuation of the crop would perhaps be about $500,000, or about one-third of the value of the district's annual consumption in sugar. The section in which the most cane is grown is around Siokhe, Pholam, and Ticthoa, all in the Changchow prefecture.

It was thought at one time that a profitable sugar industry could be established in the Amoy district. Several mills with more or less modern equipment were started in Changchow and at other points in the cane-raising region. *But the high hopes entertained were not realized, for the reason that the growers failed to supply the mills with sufficient quantities of cane to operate on a paying basis.* The mills were forced to close down, and to the present time have not been reopened.

Canton Delta

This region was famous for sugar production in former years but the industry is now confined to Tungkwan and Waichow where brown, white and candy sugar is made. The annual production is said to reach as high as 400,000 piculs, but this is perhaps an over-estimate. The output is exported through Canton, Kowloon and other ports. Cane is also grown and crude sugar made and exported from the island of Hainan, the province of Kwangsi and Chekiang. In fact, in nearly every place in south China sugar cane is cultivated in small patches.

Kiangsi Province

Tangkiang in the Kanchow district of south Kiangsi is also a sugar centre of some importance. Here the practice is for a few hongs who engage in its manufacture to contract with the farmers a few months ahead for the supply of cane which is paid for on a fixed percentage of the sugar extracted and at a fixed price. This would seem to be the central factory system in a crude form, and might serve as the starting point at some future date for a modern central factory contracting for its supply of cane in the district.

Szechuan Province

Out of a total estimated production of 400,000 tons of sugar, for the whole country the province of Szechuan produces one third, or 133,000 tons.

Large quantities of sugar cane are grown in West China, one variety of which—reddish-purple in color and 5 to 8 feet in height, with a diameter of 1 to 1½ inches—is sold in its natural state for chewing, being succulent and of excellent flavor. The crop is harvested in November, but the canes are buried in such a way that they keep for many months and are taken up and sold according to the market demand.

The cane from which sugar is made is known as white cane and is considerably taller, though of smaller diameter, than the red variety. It is very rich in sugar content and is a most important crop in the Neichiang and Tzechow districts. This cane also ripens in November, but is frequently seen in the fields as late as February.

A few years ago influential Chinese interested in the sugar industry desired to improve the methods of cultivation and to obtain sugar-cane seeds or cuttings from the United States or the East Indies, so that a better quality of cane could be produced.

The promoters of the scheme collected $158,000 United States currency, and compromised to raise $236,000 more if necessary to erect a factory to produce 30 tons a day. Enough cane is grown to keep such a mill in operation. Altogether there are about 48 sugar districts in Szechuan, the most important of which are Chienyang, Tzeyang, Tzechow, and Neichiang. Chienyang and Tzeyang alone are said to produce about 40,000,000 pounds of sugar a year, and it is estimated that five times this quantity is produced in Tzechow and Neichiang. Sugar cane in these districts is cultivated, for the most part, along the river banks, greatly facilitating transportation.

Refineries in China

It is difficult to obtain detailed information about the equipment and outputs of the two Hongkong refineries. The Taikoo Refinery owned by Butterfield & Swire is operated as a private enterprise and no reports are published. The China Sugar Refining Co. Ltd., of which Jardine, Matheson & Co. are the general agents, however, is a registered Hongkong Company capitalized at $2,000,000 (silver) divided into 20,000 shares of $100 each fully paid up. The gross profit for the year ending December 31, 1920, including credit balance of $33.806 from the preceeding year was $2.996,741. The company paid an interim dividend of $15 per share on August 21, 1920 ($300.000) and a final dividend of $65 per share ($1,300,000) a total of 80 per cent for 1920, carrying forward to the 1921 account $75.781. The Company's assests in land, buildings and machinery, which embrace the East Point Refinery at Hongkong, the Hongkong Distillery and the Swatow property are valued at $1,149,990. The distribution of the profits for the year ($2.996,741 is evidence of the sound and conservative financial policy pursued by this enterprise. This was apportioned as follows: Sugar fluctuation account, 700,000; equalization of dividend fund, 300,000; Employees' provident fund, 100,000; building reserve, 140,000; write off patent rights, 50,000; bonus to staff, 30,960; dividends, 1,600,000; carried forward, 75,781.

These figures may also give some indication of the prosperity enjoyed by the larger but private enterprise of the Taikoo Refinery. This magnificent showing made by the Hongkong refineries undoubtedly influenced the Chinese in Shanghai to have a refinery of their own located outside the settlement in territory under Chinese jurisdiction. The company, like all new enterprises in China, is being launched as a patriotic venture in order to create the proper atmosphere for the sale of shares. The promoter, Mr. M. Y. San, is the head of the largest and most successful confectionery business in China, whose products are gradually displacing imported biscuits and candies for native consumption. The prospectus of the new Chinese National Sugar Refining Company, Ltd. calls for a capital of $5,000,000 (mexican) divided into $50 shares, of which one quarter is to be paid in immediately. There are forty organizers of the new enterprise, including such well known names as Chang Chien, C. C. Nieh, C. T. Wang, Li Ching-fang, Chang An-sun and others. Four-fifths of the capital has been allotted to the organizers, and the other fifth placed on the market. The prospectus states that the profits of the enterprise will be divided as follows: 55 per cent. to the shareholders; 10 per cent. as a special bonus for the organizers; 10 per cent. to pensions and reserve funds; and 25 per cent. as bonus for directors, auditors, general manager, staff, etc. The bonus appropriation of prospective dividends would seem to be liberal enough to cover all necessary calls upon the company from official sources, and indicates that the enterprise is expected to be extremely profitable.

Malayan Match Factory

With the ultimate objective of supplying the entire market of the Malay peninsula, Malayan Matches, Ltd., a concern capitalised at $1,000,000 (Straits currency) and registered in the F.M.S., commenced operations in the latter part of June.

The machinery, of German manufacture, was taken over from a defunct firm which had tried to operate in India. A company was formed to set up the plant in Malaya some three years ago, but an unexpected delay was encountered when the F.M.S. government refused to allow the company's engineer to enter the states, under the ruling barring Germans and Austrians. The Teutonic match expert was sent to Java there to await the efforts of the company to have him admitted. He finally severed connections with the firm, and an Englishman, Mr. D. J. Simons, was commissioned to install the plant, Mr. Simons is at present being retained as engineer in charge.

A labor force of 85 including Malays, Chinese and Tamils, mostly women and boys, are employed in the new match factory. The product, which is already on the market, is as yet a bit crude, but the labor has not yet been completely trained. Until the finished matches are considered of sufficiently high grade, the plant will not be run at capacity speed. When operating at normal, the output will be form 850 to 1,000 gross boxes per day, which is equal to the consumption of Malaya. While no effort will be made to invade outside territories, Company officials expect to displace a good portion of Japanese imported matches on the F.M.S. market, as the Malayan product is selling for $1.30 per gross, which is lower than the Japanese figure.

The plant is situated about 30 miles from Kuala Lumpur, F.M.S., near the Malayan collieries, and on the edge of a 16,000-acre forest reserve from which the material is drawn.

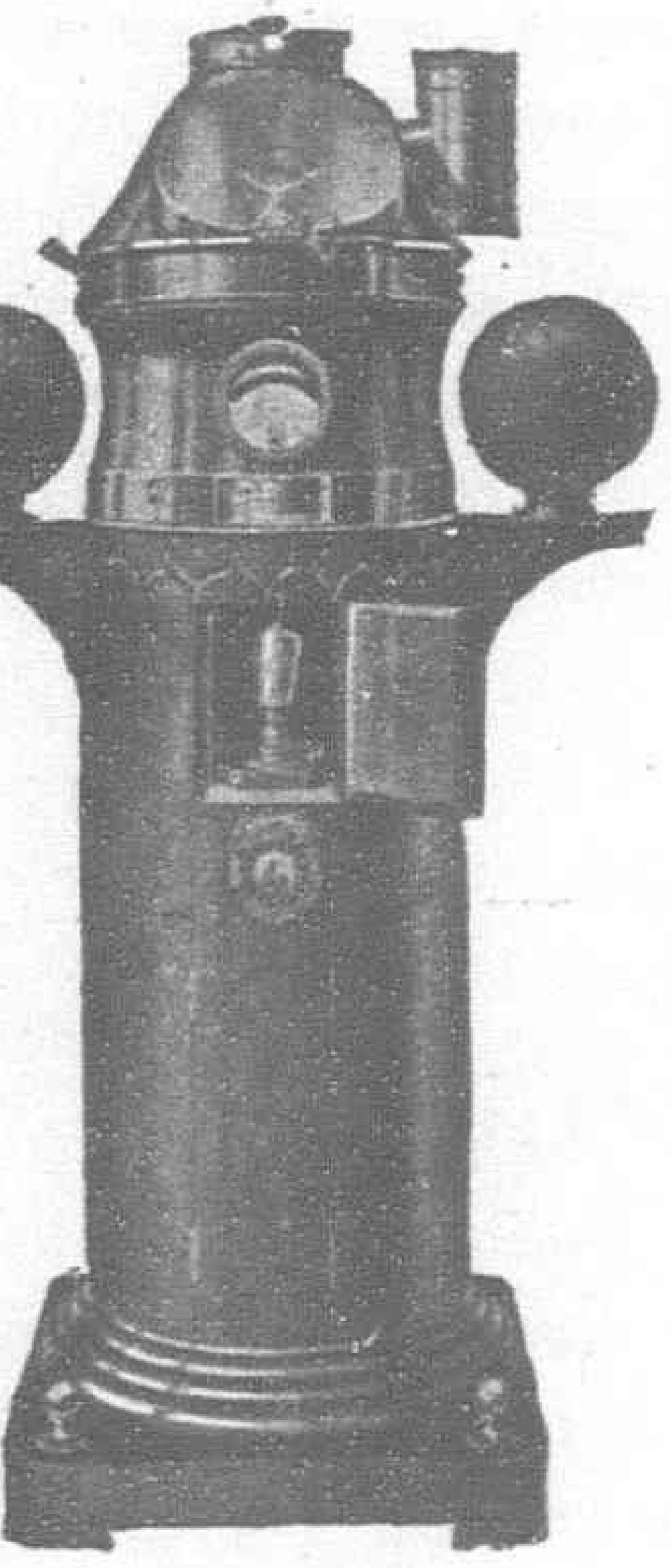
Messrs. J. A. Russel & Co., Ltd., Kuala Lumpur, are managers and agents for the new concern.

Navigational Instruments

THE navigator of the present day certainly owes a great deal of gratitude to the scientist for the developments made in connection with the navigational equipments fitted to modern ships.

In this work the late Lord Kelvin took a very prominent part. His inventions and additions in connection with the mariners' compass, sounding machines, etc., have been of the highest importance. Were it not for these scientific advancements, the safe navigation of the fast and up-to-date liner would be a matter of the greatest difficulty. Great attention is naturally given to the equipment of every new liner with the most improved and up-to-date compasses.

Messrs. Kelvin, Bottomley & Baird, Ltd., Glasgow, London and Newcastle, are the sole makers of the late Lord Kelvin's inventions, and have fitted the largest liners with their well-known compasses and sounding machines. The most recent vessels to be equipped with these instruments include: *Aquitania, Cameronia, Windsor Castle, Empress of Canada, Paris, Conte Rosso.*



"KELVITE"
Standard Compass

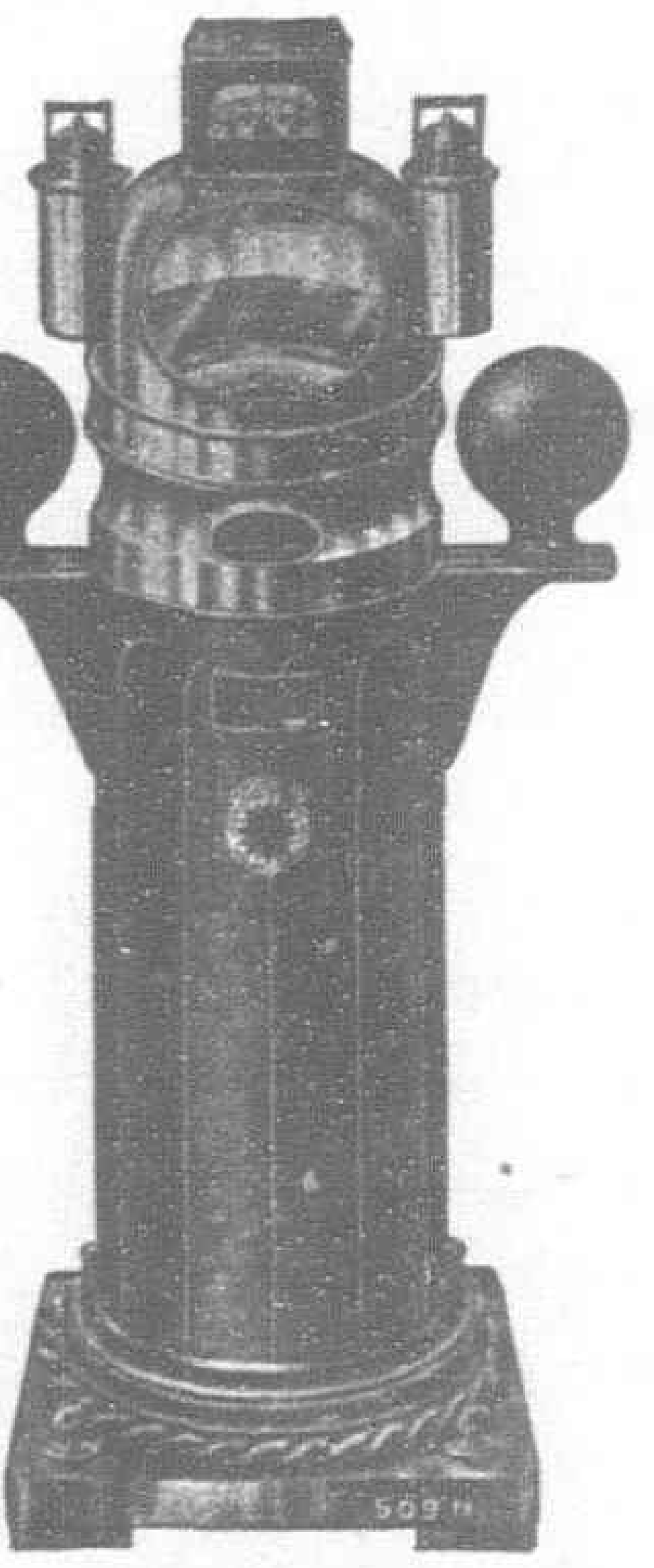
The standard compass on all these vessels is Lord Kelvin's patent, as illustrated. This compass is so well known that it is not necessary to describe it in detail.

Messrs. Kelvin, Bottomley & Baird, Ltd., a few years ago introduced a new scientific steering compass to the navigator, specially designed for positions where considerable vibration occurs.

This compass is known as the Kelvite Vertical Card Compass, the salient features of which are—

(*a*) A liquid bowl containing card of relatively small diameter, which ensures extreme steadiness and sensitiveness of the card.

(*b*) A greatly magnified image in a vertical plane of the part of the card which is in the vicinity of the lubber point is of considerable advantage. The complete card may also be viewed by the steersman through the usual sight in the helmet. This compass is designed to allow the card to be illuminated from above or below.

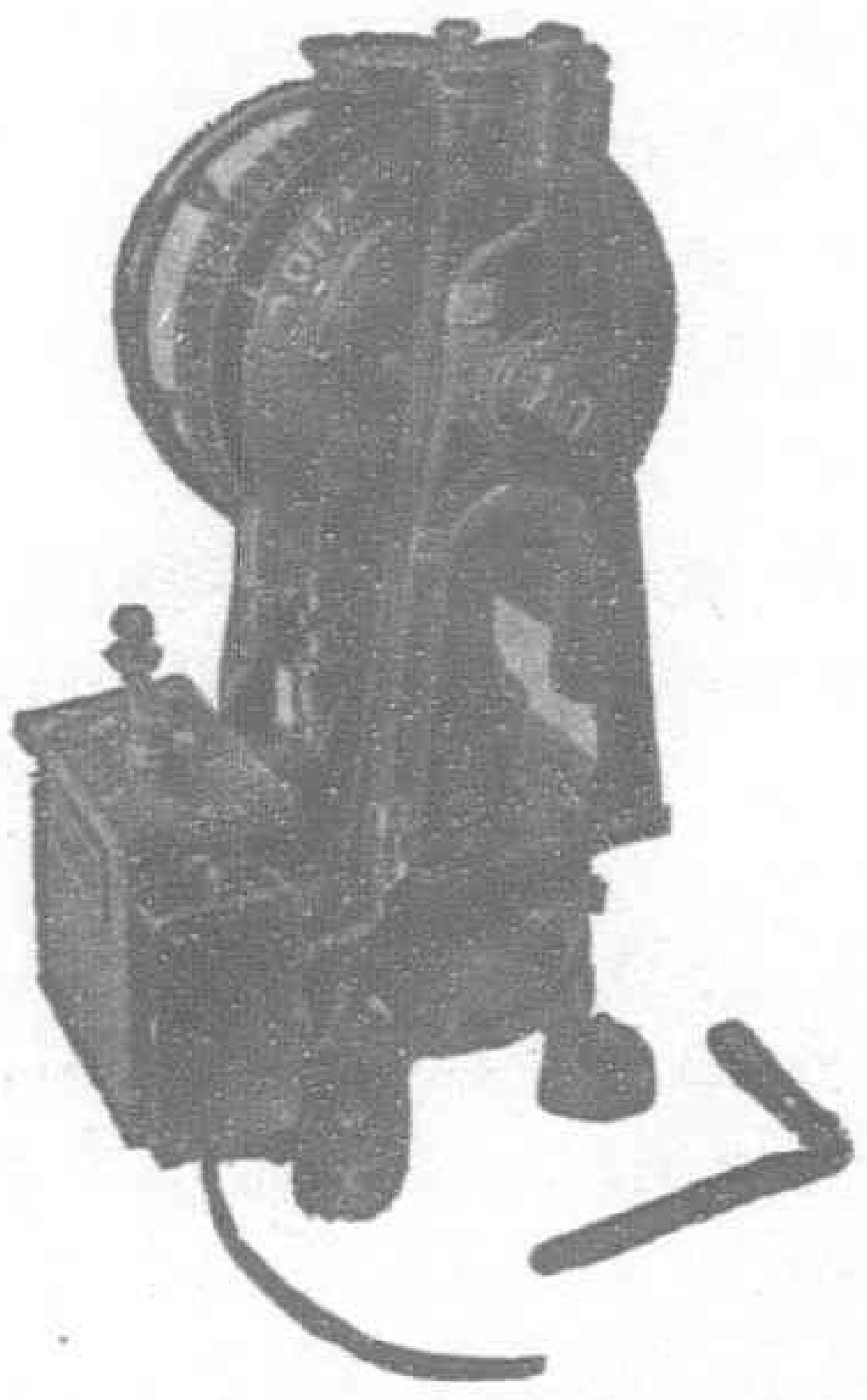


"KELVITE"
Vertical Card Compass

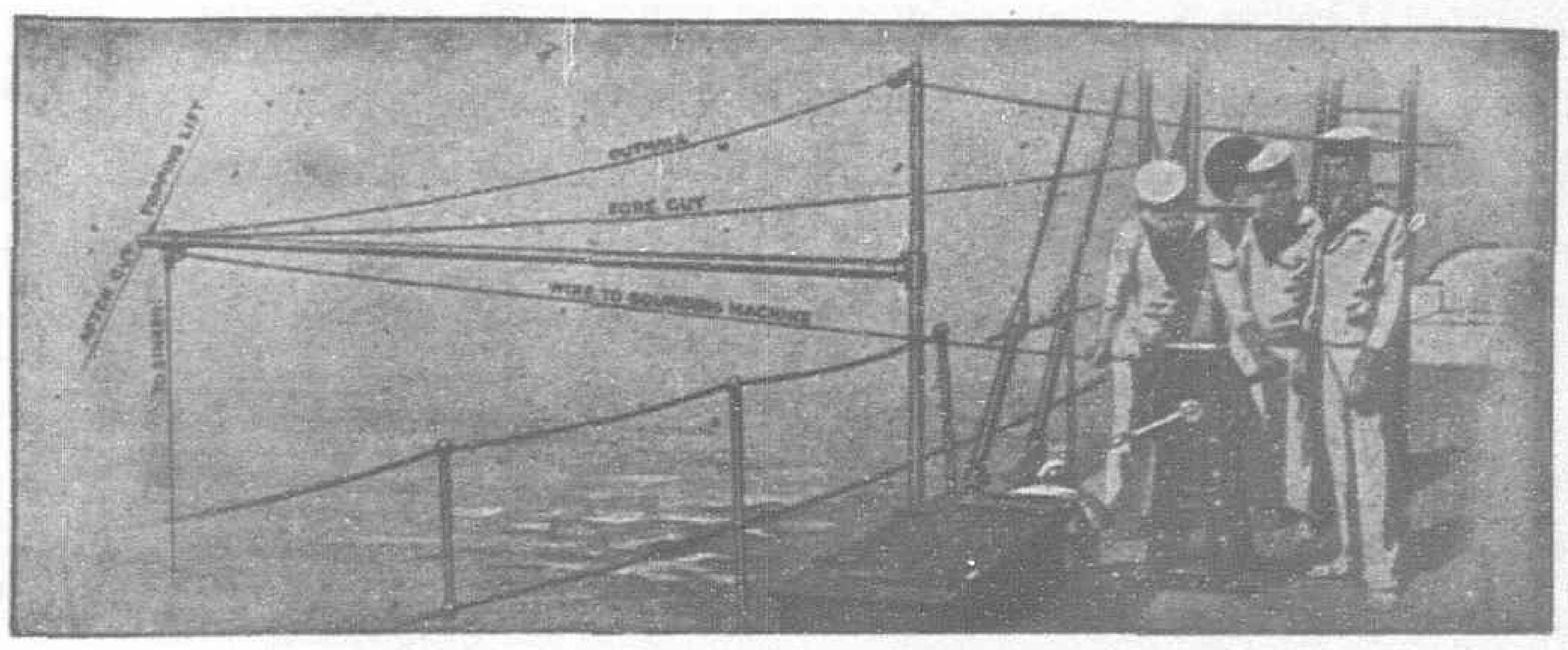
Another improved appliance supplied by Messrs. Kelvin, Bottomley & Baird, Ltd., to the *Aquitania* and other vessels is the latest form of Lord Kelvin motor-driven sounding machine. This instrument possesses distinct advantages over any other similar appliance, amongst others are that soundings can be taken from the navigating bridge instead of from aft, and that the navigator is able to read conveniently the depth of each cast for himself instead of being dependent upon a message conveyed from aft.

Large view magnified vertical image

The dial showing the amount of wire line run out is fixed on the top of the machine, so that, if the machine is fixed below the bridge, the dial can be read conveniently from above. The dial indicates accurately the exact length of wire out, and the figures are bold and clear to facilitate reading. While the depth may be ascertained in the usual way by means of the depth recorder or the chemical tubes, it is intended that with this machine the depth may be readily ascertained from the length of wire out. Tables are prepared showing the depth indicated for each fathom of wire run out with the vessel traveling at all varying speeds, consequently, when taking a sounding and the vessel's rate of speed at that moment being known, the corresponding depth for any length of wire can be instantly ascertained, the moment the lead touches bottom, by inspection of the tables.



"KELVITE"
Motor Driven Sounding Machine



Soundings being taken from Amidships

Messrs. Kelvin, Bottomley & Baird, Ltd., issue a quantity of interesting literature dealing with their unique manufactures, which can be obtained on application at their head office, 18 Cambridge Street, Glasgow.

*Messrs. Kelvin, Bottomley & Baird, Ltd., have introduced the term " Kelvite " which they apply to all their manufactures whether they be Lord Kelvin standard compass, sounding machine or otherwise. Messrs. Kelvin, Bottomley & Baird, Ltd., advise that the word " Kelvite " means manufactured by them and that would-be purchasers who desire the genuine articles should specify them with the prefix "Kelvite," thus: "Kelvite" Standard Compass; "Kelvite" motor-driven sounding machine, etc.

REVIEW

A book entitled " Universities and Scientific Life in the United States," has recently appeared from the Harvard Uuiversity Press, Cambridge, Mass., U.S.A. The author is Professor Maurice Caullery of the Sorbonne, exchange professor from France to Harvard University, during the war. Prof. Caullery is a biologist, and a man of keen observation not only in his own field, but in general affairs as well. He has presented the development, present status, problems and ideals of American university education from a fresh viewpoint, all too little heard from—the standpoint of the scientific man. His criticism of both American and European ideals will help educators in China in preserving a sane balance of thought on educational programs. Also the book will be useful to Chinese students as a guide to American universities, more helpful from being the work of a foreign observer.

The translation is by Prof. James Haughton Woods of the Harvard department of philosophy, and Prof. Emmet Russell of Nankai College, Tientsin.

The New Diamond Valve-in-Head Soot Blower

By Robert June, M.E.

SOOT, it has been stated, is the best heat insulator known, being more than five times as effective as asbestos in preventing heat transference. Those who have to deal with the soot problem continuously, know that this statement is literally true. You can no more expect efficiency out of a boiler, the fire surfaces of which are coated with soot, than you can expect efficiency from a man with a bad cold. There is a congestion and bad circulation in both cases. If you want to keep up steam when the soot piles up on the boiler tubes, you will have to pile in more fuel.

Soot as found in steam boilers varies considerably in appearance and composition, depending upon the grade of coal burned, conditions of combustion, and part of the furnace from which the sample is taken. Nearest the fire the deposits formed consist largely of ash. Analysis of samples of soot, taken from a boiler, shows in addition to the "pure soot" the presence of silica, alumina, iron oxide, various alkalies and sulphur dioxide.

In all but the coolest portion of the setting, soot is usually gritty in texture. The grains may be as large as medium size sand, or as fine as cigar ash. These particles are in a plastic state when they leave the furnace, and striking the boiler they adhere to the tubes. If this deposit is not removed frequently it quickly increases in amount and changes in character. The carbon burns out in part and the mass cements together. The repeated reduction in heat-absorbing surface increases the temperature of the flue gases so that the process of cementation is continuous and constantly increasing in intensity. An extremely hard, clinker-like formation results. In a short time the tubes in some portions of the boiler are thickly coated, thus materially reducing its capacity.

The Five Essentials in Preventing Soot Waste

The five essentials in preventing heat waste caused by soot are:

(1) Frequency of cleaning in order to minimize the cumulative effects of increasing deposits. Tubes should be cleaned three or four times in 24 hours.

(2) Thoroughness of cleaning, in order to maintain high furnace and boiler efficiency, and prevent the corrosive effects of soot accumulation.

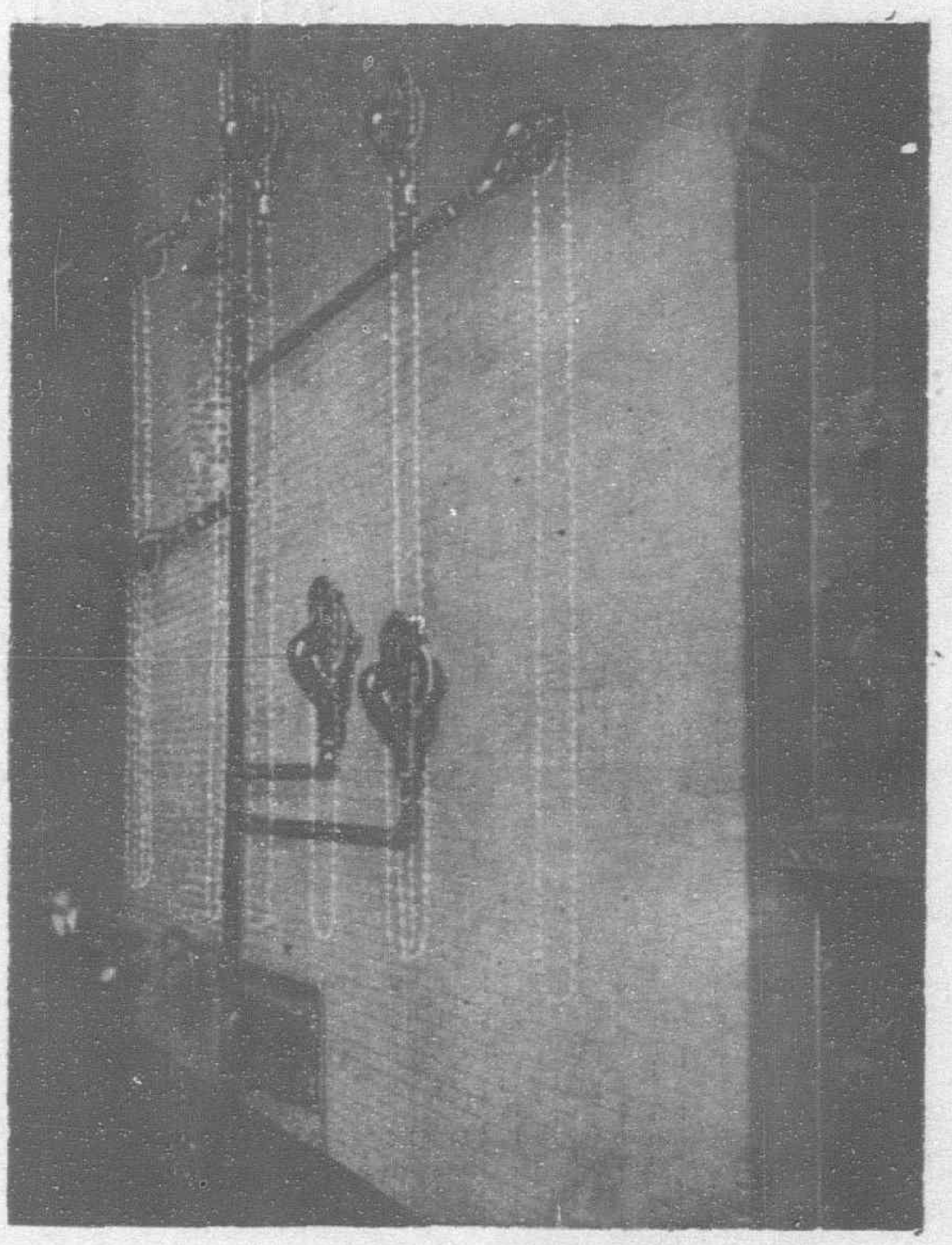


Fig. 1.

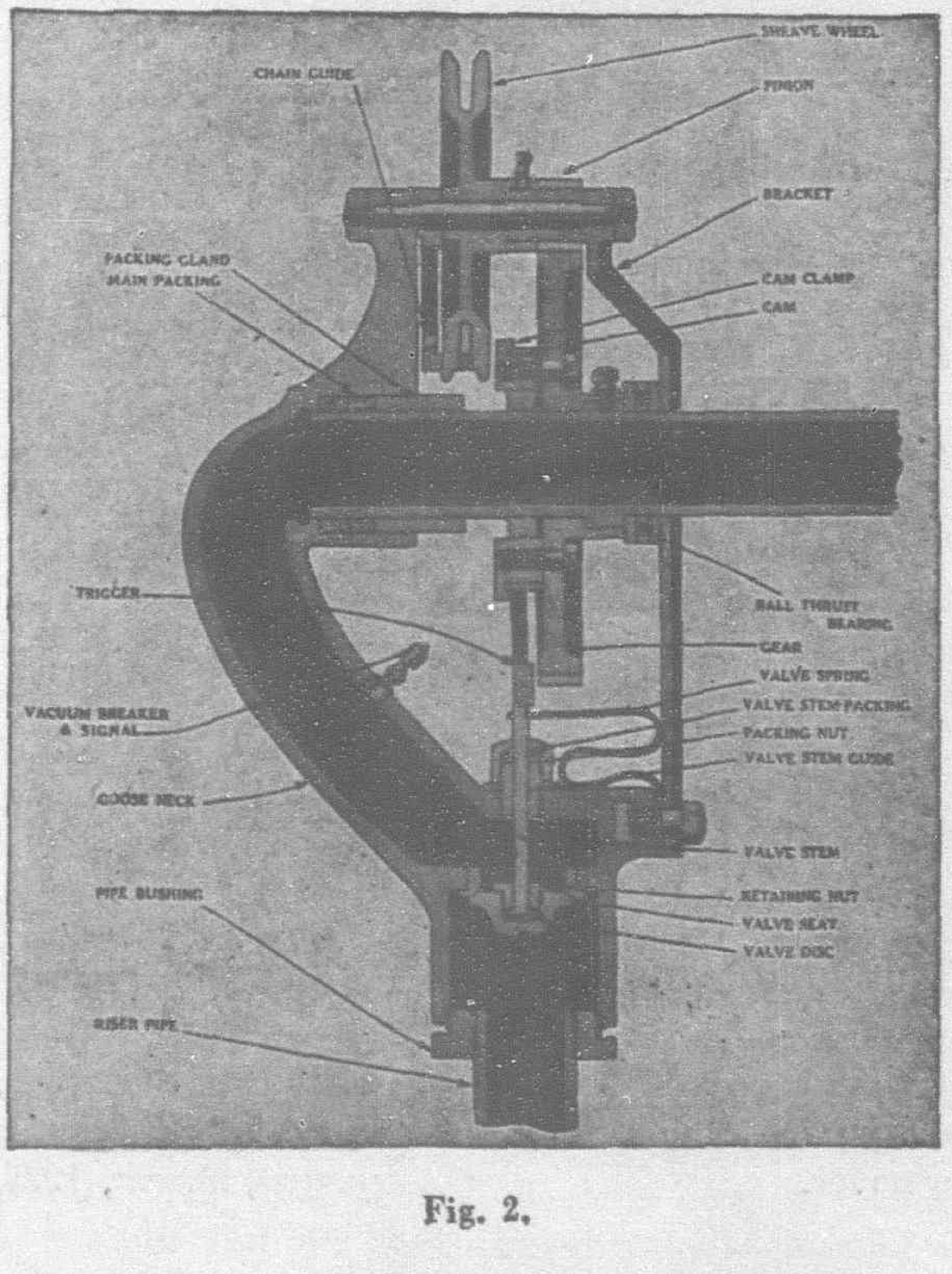


Fig. 2.

(3) Availability of system. The soot blower system should be instantly available, automatic in action, capable of being operated for an exact pre-determined period of time.

(4) Durability of system: The blower units should be so designed and constructed that they will withstand the stress of hard service without the necessity of frequent repair or replacement.

(5) Economy in Operation: The soot removing system should be cheaper in operation than hand blowing; it should be so installed as to prevent the entrance of cold air into the furnace during its operation, it should not interfere with the operation of the boilers, it should pay for itself from an investment standpoint.

The New Diamond Valve-in-Head Soot Blower

To meet the exacting requirements noted above, an entirely new principle has been introduced in soot blower design. The valve controlling the individual unit has been incorporated as an integral part of the head. This valve (Monel metal) is of the poppet type and is placed at the base of the gooseneck. This valve takes the place of the globe valve which has always heretofore been installed (at a distance of two to fifteen feet or more from the head) in the riser pipe leading from the main header.

The special valve just referred to is located at the point marked "A" in the illustration (Fig. 1). The unit is operated in the following manner: The main control and drain valves, which are the only independent valves on the soot blower line, having first been opened, and all piping drained and heated, dry steam fills the line to the entrance of the individual valve at the base of the gooseneck "A." The sheave wheel "B" (Fig. 2) is then revolved by pulling the chain. This turns a small steel cut pinion gear (not visible in the illustration). The small pinion engages the large gear "C" which is fixedly mounted on the blower element. As the gear is revolved it operates the cam "D" which causes the lever "E" to press down the valve stem "F," causing the valve to open at a pre-determined point in the revolution. After the gear has been further rotated, the cam "D" releases the lever "E" allowing the steam pressure to close the valve at a second pre-determined point in the revolution.

As the steam leaves the line the spring "C" holds the valve closed.

Construction of Valve

The valve is made with Monel metal disc and seat. Both the stem and its retaining nut are made of nickel steel. In order to secure extra hardness, which insures durability, the end of the stem is heat treated. A special feature is the provision of a guide on the seat which permits leaving the stem loose in the disc so that the valve will always seat properly. The entire construction is such that the troubles common to globe valves, such as "wire-drawing," leaking, etc., are almost entirely eliminated. Disc and seat are readily accessible so that they may be removed easily for re-grinding or renewal, should occasion ever require.

As the tendency toward high pressure and superheat is very marked in modern power plant design, the Diamond Power Specialty Corporation makes a special steel body Valve-in-Head soot blower for such boilers as require this type of equipment.

Advantages of this Type of Soot Blower

The advantage of the Valve-in-Head soot blower as compared to soot blowers of the independent valve type, fall into two general groups.

Direct Economic Advantages.

1. Labor—a saving of approximately 50 per cent.
2. Steam—a saving of 30 to 50 per cent. or more.
3. Pipe, Valves and Fittings—a saving of 50 to 66 per cent. in cost of pipe, valves and fittings.
4. Maintenance—a reduction in annual charges of 25 to 50 per cent. or more. Practically complete elimination of condensate obtained.
5. Efficenicy—greater cleanliness of boiler assured.

Indirect Economic Advantages.

The following advantages, while primarily of a mechanical nature, have an important dollars and cents value :—

6. Interchangeability—especially adapated to replace other blower heads.
7. One Model Standard—head is made in one size for all boilers.
8. Control—Steam may be intermittently discharged over two or more arcs in revolution. Arc or arcs of steam jets within boiler invariably cover exact pre-determined limits. Speed at which blower element may be revolved is so controlled by reduction gearing as to make improper operation extremely unlikely. Unit provided with visible and audible signal to indicate valve open.
9. One Direction Operation—revolution is always clockwise; hence blower element cannot work loose from head either partially or entirely.
10. Ease of operation—gearing and ball thrust bearings overcome friction.
11. Valve Design—time of opening and closing exactly adjusted to soot blower operating conditions, being slower than the standard quick-opening valve, and faster than the standard globe valve, thus solving a problem of long standing. Quick-opening valves have the advantage of causing a sharp thrust of the unit, due to rapid admission of the steam. With globe valves, the tortuous passages cause marked reduction in effective pressure. There are also losses of time and steam, from the slow opening and closing—losses which seem of small amount as respects a single operation, but which become important when spread over a period of time and a number of boilers.
12. Practical elimination of the possibility of water entering the portion of the soot blower inside the boiler.

It has been demonstrated repeatedly by practical experience in the largest power plants in America that Diamond Valve-in-Head soot blowers will effect such important economies as—a saving of 4 to 8 per cent. in fuel—an increase in over-all efficiency of 3 to 4 per cent.—a decrease in consumption of steam required for cleaning, and—a marked saving in labor and labor turnover.

Diamond Soot Blowers

Diamond Power Specialty Corporation, Detroit, Michigan, U. S. A. are the exclusive manufacturers of Diamond soot blowers in the United States, having purchased as of March 1st, 1922, the entire plant and the good will of the Diamond Power Specialty Company, a co-partnership, the members of which retire from the soot blower business in the Western Hemisphere.

Diamond soot blowers as made by the Diamond Power Specialty Corporation are the original Diamond soot blowers which have been produced in Detroit for the past twenty years. These Diamond soot blowers are adapted to all types of high pressure steam boilers for both marine and land power plants. Saving in fuel, labor and steam is effected by their use and boiler efficiency and capacity are increased.

The Asahi Petroleum Company

THE Asahi Petroleum Company, Ltd. has absorbed the Imperial Petroleum Company and recently paid a 15 per cent. dividend, which has been in operation for four years and a half. The merger is intended to control the petroleum market in Japan.

Among the oil wells owned by the Asahi Petroleum Company is the Akita well which had so large a flow at first that the company was unable to take care of it. The opinion of experienced engineers and petroleum specialists is that the supply of this well is almost unlimited. Besides this, the company owns other wells with very promising futures.

From December 1st, 1921, to May 31st, 1922, the company made a gross profit of Y.471,637 and excluding amounts set aside for redemption of fixed capital, net profit amounted to Y.391,637, and a dividend at the rate of 17 per cent. per annum was paid for the term. It is said that the methods of calculation of this company are in accordance with the most approved systems, and that if they had ambitions to pay higher dividends, 20 per cent. would have been quite possible by changing the method of accounting.

The main officers of the company are well known as expert oil men. The president is Mr. Kojiro Matsukata, head of the Kawasaki Dockyard Company. Managing director, Mr. Inojo Seshima, was former president of the company, and Mr. Oka was formerly managing director of the Imperial Petroleum Company. The other officers are: Directors: M. Naruse, M. Yotsumoto, H. Minagawa, K. Nagatome, K. Fujita and R. Miyao; Manager: E. Inoue; Auditors: R. Iwatate, S. Okamoto and E. Nagasaki.

The head office of the company is at No. 1, Itchome, Yurakucho, Kojimachi-ku, Tokyo.

Daido Electric Transmits Power 160 Miles

ON July 1st, the transmission equipment of the Daido Denryoku K.K., from its power plant on the Kiso River to Osaka city, was experimentally opened. A total of 77,000 volts was successfully transmitted, with results better than the company had expected. On the twenty-first, 22,000 kilowatts were supplied to the Osaka Dento K.K., Keihan Dentetsu K.K., and the Kyoto Dento K.K.

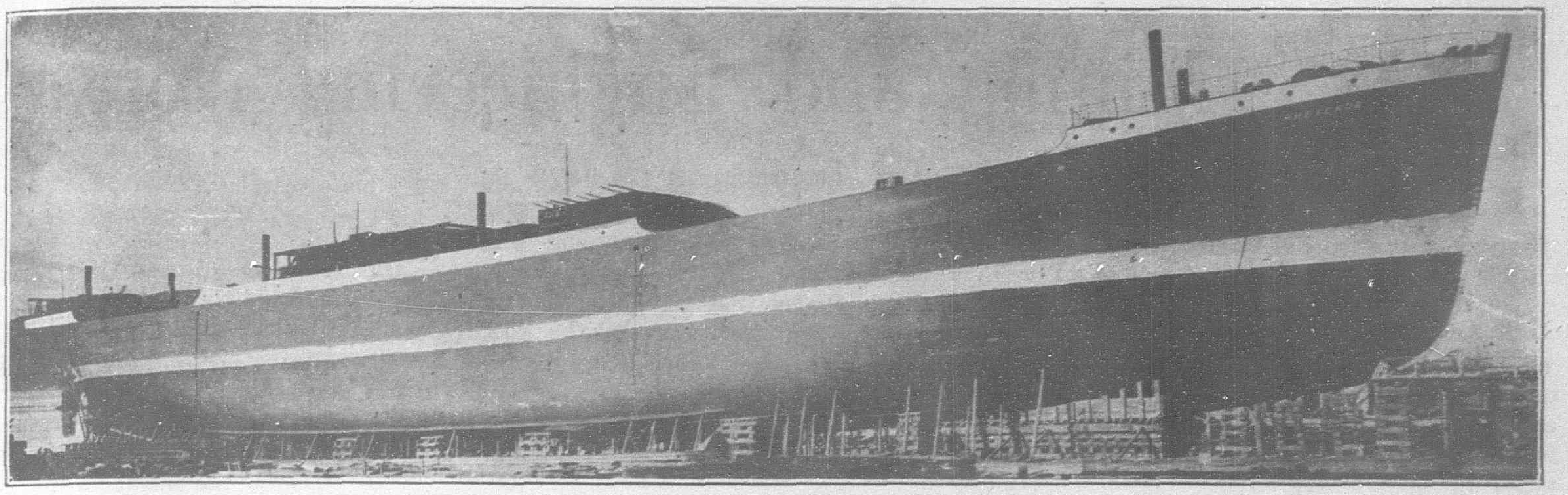
The equipment of the Osaka transformer station is of the latest type for regulating current transmitted over long distances. At the end of August the 12,500-kilowatt coal-burning power plant at Keima will be completed. This power will be used for reserve, so that when water is low in winter the company will have sufficient power for all its needs.

Three power plants of this company will be completed as follows:

(1) Dokusho Power Plant, capacity 40,700 kilowatts. To be completed, August, 1923.

(2) Momoyama Power Plant, capacity 23,700 kilowatts. To be completed, October, 1923.

(3) Oi Power Plant, dam type, 42,900 kilowatts. To be completed, March, 1924.

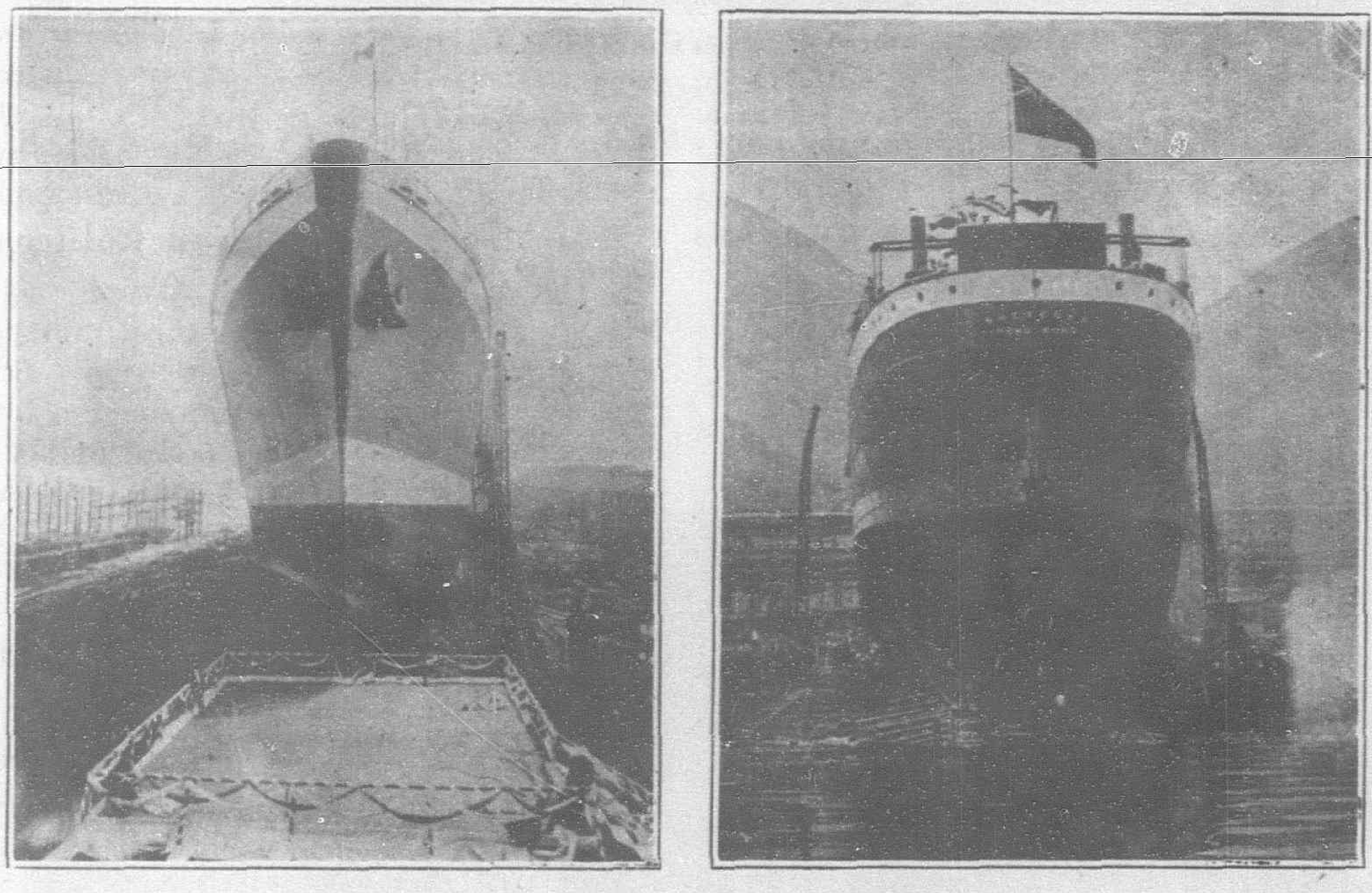


The s.s. "Rhexenor," a 10,000-ton freighter built at the Taikoo Dockyard at Hongkong for Messrs. Alfred Holt & Co.

A "Blue Funnel" Launching at Hongkong

ANOTHER addition to the "Blue Funnel" fleet of Messrs. Alfred Holt & Co. was successfully launched at the Taikoo Dockyard in Hongkong on June 29th. The naming ceremony was performed by Mr. C. W. Beckwith. The principal dimensions of the vessel are: Length over-all 477-ft. 6-in., breadth over-all 58-ft. 4-in. and 35-ft. 3-in. depth to upper deck from bottom of keel, the total gross tonnage being 8,040, and deadweight carrying capacity will be about 10,000 tons. The *Rhexenor* has two complete decks with an orlop deck forward, poop, bridge and forecastle and citadel deckhouse at fore end of bridge, two pole masts and ten derrick poles, also six cargo hatches. The vessel has a raking stem, elliptical stern, and cellular double bottom all fore and aft, the wings of which have been carried well up the sides of the vessel. Eight watertight bulkheads are carried to the upper deck, giving the vessel six cargo holds. The space under the forecastle has been fitted up for emigrants, while the space under the poop has been utilized for the accommodation of sailors and firemen. Petty officers' rooms are on the bridge deck alongside the engine casing. In the citadel house at the fore end of the bridge deck, the saloon, engineers' rooms and three staterooms have been arranged, and on the deck over the saloon is a steel house containing the captain's day and night cabins, also four rooms for officers. Over this house again is the navigating bridge with wheelhouse and chart room. The vessel is supplied with eighteen steam winches with derricks carrying loads varying from 2 tons to 40 tons. A powerful Marconi wireless apparatus is installed, with suitable rooms for the operators.

The machinery consists of one set of Parsons latest turbines driving through double reduction gearing and capable of developing a total shaft horse-power of 6,500. Steam is supplied to the turbines by two large double-ended boilers, one single-ended auxiliary boiler is also provided, and all the boilers have a working pressure of 220-lb.



Bow and Stem View of the s.s. "Rhexenor"

Electric light has been fitted throughout the ship.

When completed and on service the *Rhexenor* will attain a speed of 14 knots.

Industrial Development of Hokkaido

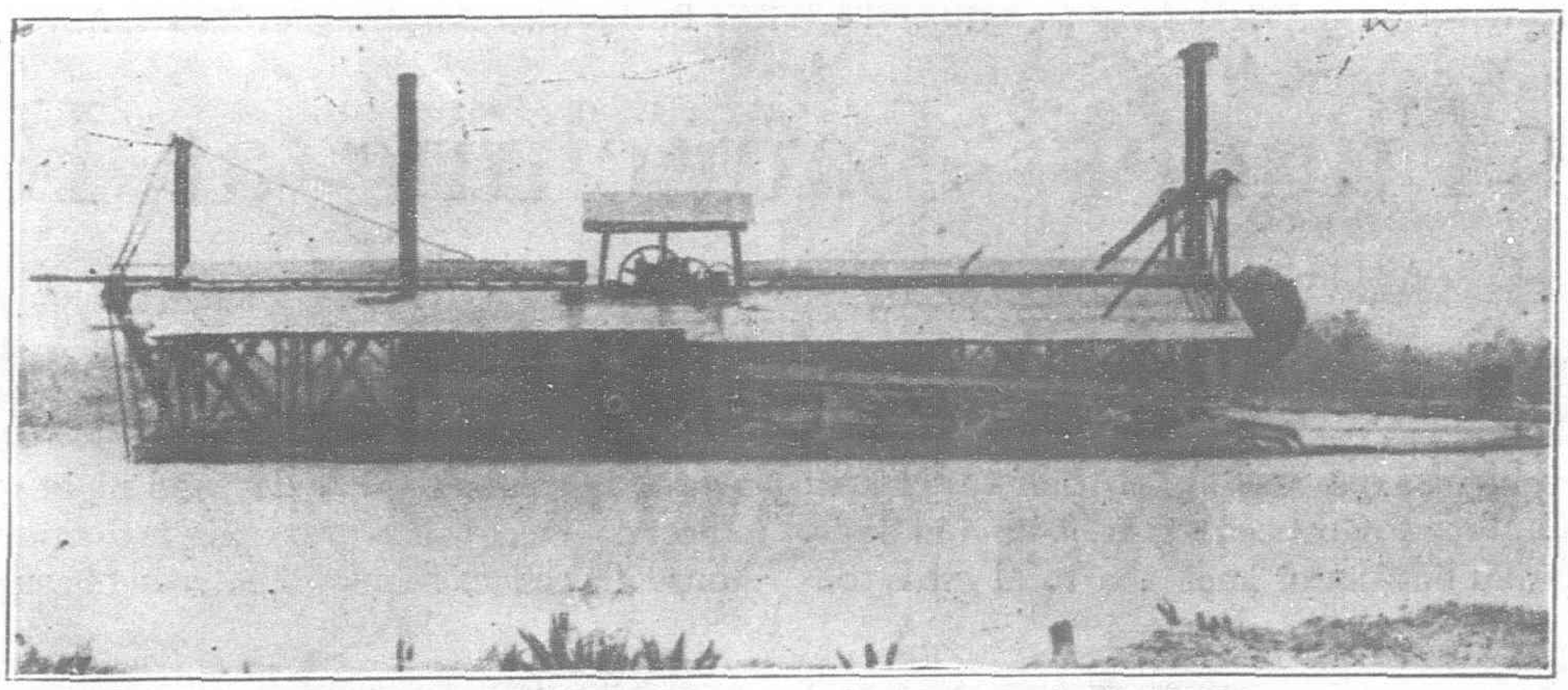
The principal industries of the Hokkaido, the most northern of the main islands of the Japanese empire, are fisheries, lumbering and paper making. The merchants of Hokkaido display a keen interest in business and give a quick interpretation to business problems.

The ports of Hakodate and Otaru afford excellent harbor facilities. All cargoes, except a few of lumber and fish, from these ports load for transhipments at Yokohama or Kobe and for that reason the cargo movement is confined to the Japanese coastwise trade. These cities have a population of more than 100,000 and afford an excellent market for the specialty trades. The city of Sapporo has, in addition to government headquarters, the Imperial Agricultural College. This college means a great deal to the future development of Hokkaido and each year there is an increased development in agricultural pursuits. The Oji Paper Co., at Tomakomai, is the largest paper company in Japan and operates a complete unit, including the cutting of timber from its own forests, the development of hydro-electric power which supplies not only its own plant and near-by villages but the cities of Sapporo and Otaru as well, and the production of its own sulphur and lime supplies.

F.M.S. Mining and Engineering Notes

62 Tin Dredges in Malaya

IN 1914, there was only one bucket dredging proposition of any magnitude in the F.M.S. In that year the Malayan Tin Dredging Co., Ltd., started with one dredge in operation one under construction and four projected. By the end of 1920 there were 30 bucket dredges in operation and with 22 proposed and under construction. Including the ten dredges working in the Siamese tin fields adjacent to the F.M.S., this makes a total of 62 dredges operating and proposed in the Malay Peninsula, a development that has taken place within the past six years. If we add to this the number of gold dredges working in the Philippines, Korea and Siberia, the Far East takes its place as one of the most promising markets for dredges in the world.



Type of Tin Mining Bucket Dredge in use in the F.M.S.

The annual report of the F. M. S. mines department for the year 1921 makes rather depressing reading in regard to tin output and prices. The following figures tell the story of how the slump has affected the tin industry of the peninsula:—

Year	Ore price.	Received by miners.	Duty
	$ c.	$ c.	$ c.
1915	54.72	45.65	6.77
1916	61.27	51.35	7.82
1917	78.29	61.30	12.56
1918	108.45	85.32	18.45
1919	86.89	71.40	12.00
1920	108.48	89.00	15.60
1921	61.20	49.72	7.68

Miners received less per picul in 1921 than at any time since 1915. The report says: "The outstanding feature and chief contributing cause of the low price prevailing throughout the year has been the abnormally low consumptive demand. As no corresponding decrease in production occurred a large accumulation of stocks both in producing and consuming countries had resulted by the end of the year. Until these stocks are liquidated no permanent improvement in the price can be anticipated and any attempt to unload part of these stocks at the present juncture will, no doubt, seriously retard the recovery in the price. At the close of the year conditions in the tin plate industry, which, at the beginning of the year were very bad in America and the U. Kingdom, had improved considerably. It is assumed this improvement will continue, necessitating a stronger demand, this, combined with the better labor outlook in evidence during the latter part of the year and a revival in trade conditions generally should take the price to a higher level during the ensuing year. No very marked advance in the price, however, can be expected to eventuate until the American consumption, which was very poor during the year, again approaches the normal, and the continental demand approximates its pre-war level."

The production of tungsten ores has sunk to 55 tons while the quantity of gold placed on the market was 14,674 ounces valued at £59,097, of which, the Raub mine produced 14,430 ounces.

Malayan Collieries

The bright spot in F.M.S. mining was the coal output from the Malayan Collieries, Limited, whose mine is located at Batu Arang in Selangor. This mine seems to have fully justified the expectations of its promotors, the production for the year under review being 299,351 tons, an increase of 51,434 tons over the preceding year, making a total of 1,175,950 tons since production commenced in 1918. The principal consumer is the F.M.S. railways which took 144,934 tons, the mines 92,728 tons, other F.M.S. industries 12,874, leaving 49,263 tons which were exported.

The main seam of the Rawang coalfield contains 10,000,000 tons of marketable coal, and the area of the mine is 1,800 acres held under lease and 20,000 acres under prospecting license. The surface plant comprises a boiler house with two Babcock and Wilcox boilers with patent step-grate furnaces giving a heating surface of 2,531 square feet, to each boiler, and having an induced draught Sirocco fan, 40-in. in diameter, direct coupled to high-speed steam engine, this fan being capable of giving 2-in. draught with three boilers under full power. The feed tank capacity is 30,000 gallons. The main engine house,

Malayan Collieries at Batu Arang, Selangor comprising the haulage engine section, has two double-drum haulage engines, with loose drums, geared 3 to 1 for fast haulage and each engine has cylinders 12-in. diameter by 24-in. stroke while the electric generator section has two 100 kilowatt sets, 500 volts direct current, compound wound, interpole dynamos, by Mather and Platt, Limited, these being direct driven by high-speed compound steam engines. The switchboard contains two generator panels, with overload and reverse current circuit breakers and equalizing switches, and one feeder panel, with four distribution switches, while the motor-generator is 500 volts to 100 volts and is for electric lighting.

All cables carrying current to the mines, fan and shops are special tropical twincore paper-insulated, lead-covered, laid in bitumen in stoneware troughing ; but those carrying current in the mines are armoured, and suspended from the timbers.

The ventilating fan is 36-in. diameter and is of the "Turbon" mining type capable of passing 20,300 cubic feet of air at 4-in. water gauge.

The loading stage is a temporary structure of timber and the coal after being weighed is tipped on a screen which produces two sizes of coal while the mine has one-and-a-half miles of track connected with the F.M.S. railways near Batu Arang station. The sidings near the Heapstead have a grade of 1 in 90 to facilitate handling of waggons and a 60-ton weighbridge was installed by the F.M.S. railways.

The 1921 report shows that the mine operated with 1,891 horse-power and the labor force averaged about 2,700 men. The north and south mines and open-casts Nos. 5 and 6 were operating on the top seam while open-casts Nos. 1 and 2 were operating in the bottom seam. The top seam, therefore, supplied 170,956 tons or 57.11 per cent. of the output and the bottom seam 128,395 tons or 42.89 per cent. During the year 2,652-ft. of development driving and 1,500-ft. of cross-cutting were completed.

Considerable advance was made with the hydraulic stowage scheme and the practice of replacing coal won by sand stowed hydraulically is now well established. It is intended to extend the principle and with this end in view a new sand bunker was laid down at No. 6 shaft. This bunker measures 94-ft. by 21-ft. and will hold 1,000 cubic yards of sand, which quantity can, if necessary, be flushed into the underground workings in the space of four hours. A dam for storing "flushing water" has been excavated and an 8-in. electrically driven turbine pump for taking care of the flushing nozzles has been installed near by. To deal with the drainage underground from the stowage operations, a 6-in. electrically driven turbine pump has been installed in the north mine housed in a chamber 72-ft. long by 12-ft. wide and by 12-ft. high, walled and arched throughout with brick.

Batu Caves Cement Works

The Batu Caves Portland Cement Works' (Selangor) operations were as follows, in tons, for the last three years :

Year.	Limestone.	Cement manufactured.
1919	6,786	4,395
1920	7,372	5,451
1921	6,048	1,768

all of which for the year under review was used locally and shows a decrease of production of 3,683 tons as compared with 1920.

Machinery and Hydraulic Appliances on Mines

The toal effective horse-power of steam, gas, oil, hydraulic and electrical plant employed on mines in the year under review is estimated at 59,200 (including Raub mine and the colliery) and is classed as follows :

State.	Steam.	Steam-electric.	Hydraulic.	Hydro-electric.	Suction gas.	Oil engines.	Oil-electric.	Total, 1921.	Total, 1920.
Perak	16,550	1,339	14,322	2,524	621	874	1,800	38.030	40,990
Selangor ...	7.034	900	1,042	...	383	176	1,200	10,743	13,145
Negri Sembilan	950	...	413	...	...	...	...	1,363	1,372
Pahang ...	4,108	...	1,687	2.022	52	195	1,000	9.064	8,853
Total, 1921 ...	28.642	2,239	17.464	4,546	1,056	1,245	4,000	59,200	64,360
„ 1920 ...	29,889	3,652	18,859	4,637	1,993	3,730	1,600	64,360	
„ 1919 ...	25,826	2,771	17,497	4,686	1,811	2,552	2,200	57,343	

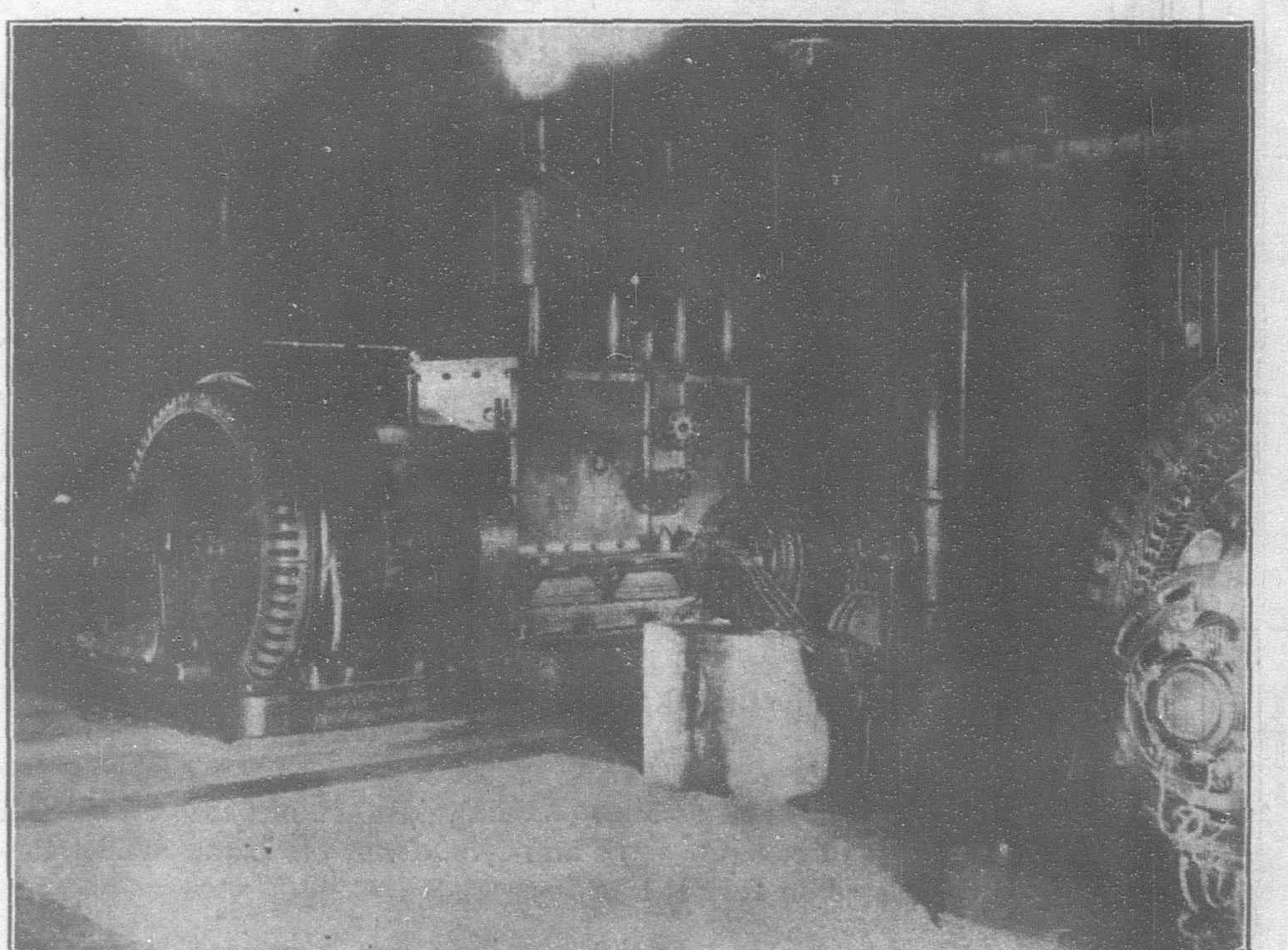
a decrease of 5,160 horse-power as compared with the previous year.

Steam and Other Plants

The increase in the use of machinery in the F.M.S. is seen in the number of plants under inspection. The total horse-power of plant installed and registered under the machinery enactment is 136,459 (inclusive of hydro-turbines aggregating 3,460 h.p.), of which, 83,125 h.p. was in employment. The number of boilers registered and under inspection totals 2,053 with a collective h.p. of 90,291. The horse-power of steam plant in employment in the year aggregated 46,182 and that of unemployed 44,109. There were 997 oil engines with an aggregate h.p. of 25,335 and 313 gas engines with a total of 17,087 h.p. Five hundred and forty-seven installations of machinery were inspected during the year, a decrease of 21 installations as compared with 1920.

Electrical Installations

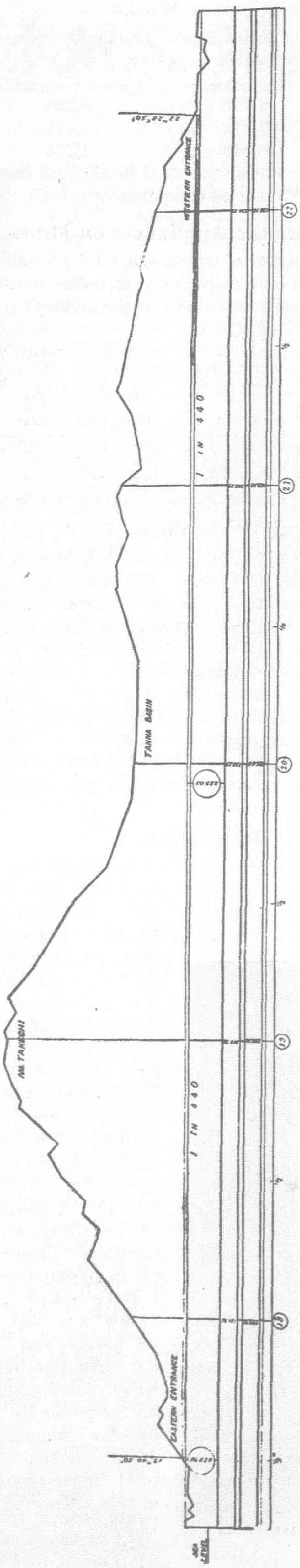
For generating purposes at the end of 1921, there were 101 installations with a total of 11,983 kilowatts distributed as follows: Perak, 65 installations, 7,097 k.w.; Selangor, 27 with 1,789 k.w.: Negri Sembilan, 6 with 79 k.w.; and Pahang 3 with 3,018 k.w. The distribution of electrical supply shows that over 90 per cent. (11,316 k.w.) was employed in the mining industry, 338 k.w. in agriculture, 264 k.w. in general use and 65 k.w. by the government. The classification of all electrical generating plant employed in the F.M.S. shows that 11,509 k.w. are used for power and 3,215 k.w. for lighting, of which capacity, 11,000 k.w. of power are used by the mining industry alone. The total horse-power of motors connected was 12,659.



A Tin Mine Power Plant: Societe des Etains de Kepong. Schneider et Cie, Generators

The Atami Tunnel

By H. C. Huggins



Profile of the Atami Tunnel Cutting

THE greatest engineering work now under construction by the Imperial Japanese Railways is the Tanna tunnel (more commonly known as the Atami tunnel), a preliminary to the electrification of the Tokaido line operating between Tokyo and Kobe, cut through one of the most volcanic regions of Japan. When completed, it will save seven miles of track on the main line of the Tokaido and eliminate the tedious haul over the Hakone mountains between Kozu and Numadzu.

The peculiar nature of the soil in which excavations must be made demanded a most careful survey by the greatest geologists in Japan. The first survey was completed in 1915 by Dr. Matajiro Yokoyama, professor of the department of science in the Imperial University of Tokyo, who reported as follows : " The Tanna basin is the crater of an extinct volcano. The bottom of the crater was once a lake, the water having drained off through some outlet to the west. It is difficult to ascertain the thickness of the strata of mud at the bottom, of the crater, but as the deepest well in the neighborhood is only 33-ft. deep, it is possible to conclude that the mud ceases at that depth, and that beneath it lies a strata of congealed lava.

In November 1915, Dr. Satoshi Suzuki, a noted geologist, also submitted a report on the geology of the district, somewhat in contradiction to that of Dr. Yokoyama, but substantiating his opinion that it was safe to construct a tunnel through the district, if it were excavated at not less than 500-ft. below the bottom of the extinct crater.

On the basis of these reports, the engineers of the railway bureau made their plans, and in March, 1918, construction work was begun with an appropriation of Y.53,000,000 by the imperial diet. Since then the work has continued without interruption, except for minor difficulties, as when the tunnel caved in last year burying some tens of workmen, many of whom were saved by the bravery of their gang boss.

The eastern entrance of the tunnel is at Atami-machi, Shizuoka prefecture, and the western entrance at Kanna-mura, Tagata-gun, Shizuoka prefecture, passing through the Hakone mountains, a distance of 4 miles and 68 chains, from entrance to entrance. The railway line will be double track, completely electrified. The width of the tunnel is 28-ft., height 22-ft. 6-in., area 544 square feet. It is built in the midst of old volcano craters, and many times work has had to be abandoned for a time, because of the breaking out of hot springs, geysers, etc.

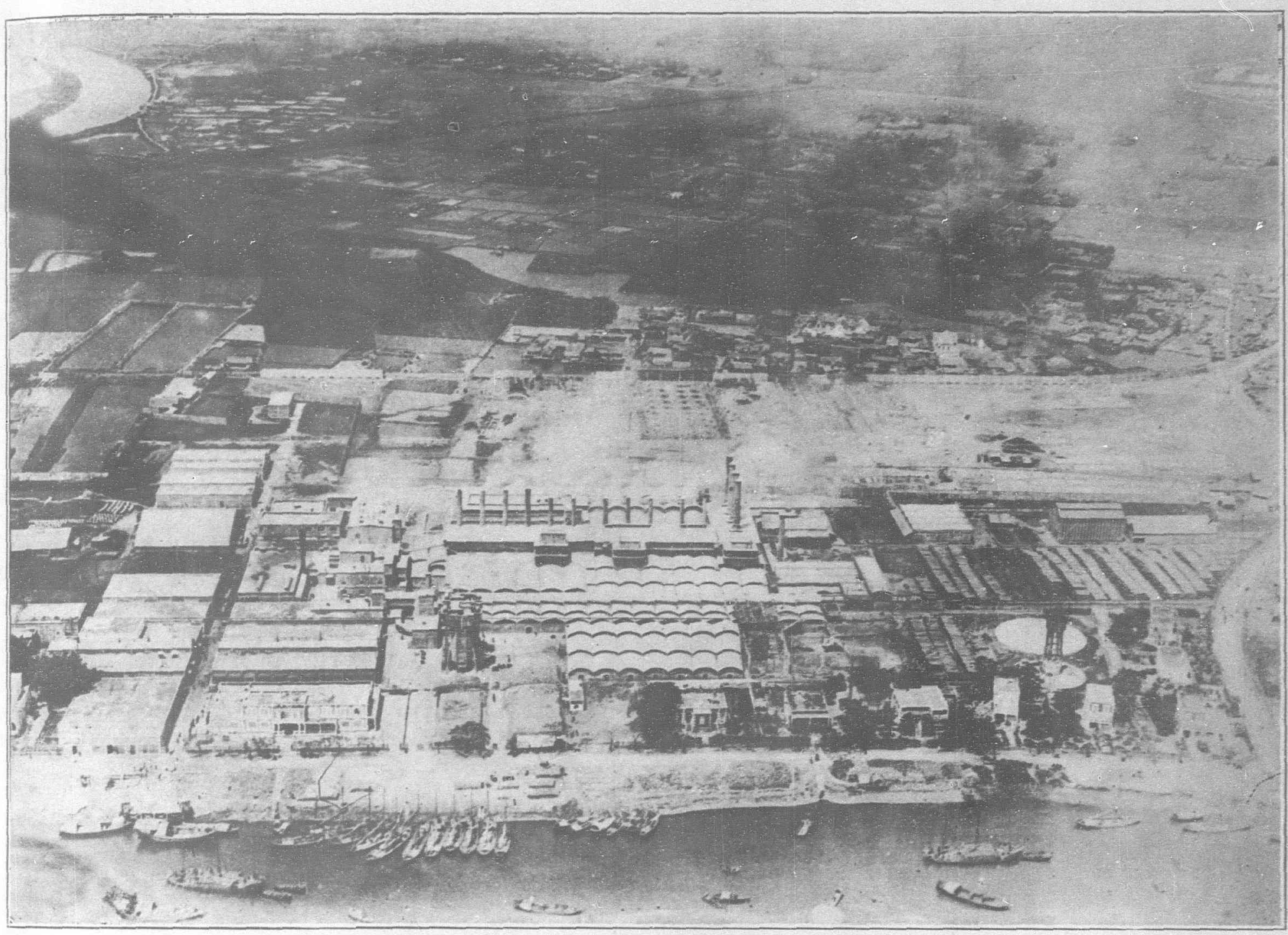
The transport of building materials, and removal of the excavated material is done by means of a light gauge railway (2-ft. 6-in.). A part of the railway is electrically operated, but in that part nearest the excavations the cars are pushed by hand. Air is supplied by ventilating equipment, which transmits 5,000 cubic feet of air a minute into the interior of the tunnel. A partial change of air is also effected by the exhaust from the compressed air of the rock drills.

All machinery used in construction is electrically operated. At the western entrance there is a coal-burning power plant equipped with four steam engines of the "Taguma" type, with a capacity of 1,600 h.p., and also a Parsons turbo-generator 3-phase, 2,200 volts, 2,500 kilowatts, 50 cycle. This plant transmits all the power used in operations, and supplies electric lights for both entrances of the tunnel, and for the outside as well.

At the east entrance 350 workmen are engaged, and at the west entrance 450. On July 1, 1922, at the east entrance (Atami) 4,468-ft. of excavation had been completed and the surface had been leveled for track construction for a distance of 2,218-ft. On the wall of the tunnel 1,968-ft. of concrete work, and 1,881-ft. of brick arch wall had been finished.

At the west entrance (Kanna), 4,940-ft. of excavation, 4,210-ft. of surface levelling, 3,993-ft of concrete work and 3,700-ft. of brick and artificial stone work had also been completed on July 1, 1922.

When the tunnel is completed in March 1926, it will be the most important link in the great plan for the complete electrification of the main line of the Imperial Government Railways.



Aeroplane View of the Haiphong Cement Works in Indo-China

The Haiphong Cement Works

THE SOCIETE DES CIMENTS PORTLAND ARTIFICIELS DE L'INDO-CHINE was founded in 1899 and the first stone of the works laid down the 25th of December of the same year.

The raw materials necessary for the fabrication of cement are found plentifully in the vicinity of the plant at Haiphong; these materials had been studied very carefully and, only after numerous analyses, the society purchased the important deposits containing the best limestone in the country, more particularly the deposits of the " Ile des Deux-Songs " in the province of Quang-Yen.

The preparation of the materials is carried out by the dry process; the clay drawn out from the bed of the Cua-Cam River is completely dried, then mixed in suitable proportions with the limestone crushed by means of powerful crushers; the whole is then very finely ground, so as to obtain an impalpable powder, the composition of which is rigorously constant.

The powder compressed into bricks is burnt in fifteen vertical kilns of a very improved system so as to enable the plant to produce a cement perfectly homogeneous. The burnt cement is ground again in powder and the finished product is packed in bags or barrels.

The driving power necessary for the whole plant was originally about 1,200 h.p. This first group was soon increased by two turbo-alternators of 1,200 h.p. each, constructed by the "Société Alsacienne de Constructions Mécaniques" at Belfort. The building for the turbo-alternators was erected in prevision of a third one of 3,000 h.p., actually in course of installation, and necessitated by the important extensions now being carried out.

The grinding of the raw materials and of the cement was originally done by means of nine groups of preliminary crushers and tube-mills; later five other grinding works were installed including two compound-crushers and three "Centaure" crushers, each of which is directly driven by an electric motor; these "Centaure" crushers are of the most powerful type; they allow obtaining easily a cement of a very great fineness, an essential quality of Portland cement.

Several chemists constantly working in the laboratory of the factory supervise all phases of manufacture.

The cement sold by the plant at Haiphong is equal in quality to the French and European brands of world-wide reputation. The results of the tests effected in the various official laboratories show that the cement possesses a very high compressive as well as tensile strength. The constancy of volume being absolute proves a quite thorough mixing of all elements.

The cement of Haiphong meets the requirements of all specifications and contracts; it is particularly suitable for all works requiring a product of high-grade quality such as reinforced concrete structures, flagging, etc.

The board of public works in Indo-China has used a very large quantity of Haiphong cement specially for the construction of the railways of Tonkin, Cochin-China and Yunnan; this board having permanently a surveyor at the factory, it can be said that the manufacture is done under its control. Many tests have been made by this board.

The artillery board also uses Haiphong cement for its construction work.

Buildings of reinforced concrete of great magnitude have been erected with the cement of Haiphong, among which dams and landing-wharfs for the coal-mines of Tonkin at Hongay; the market-halls of Saigon, the sheds of which have an 84-ft. span without intermediate supports; numerous bridges at Bangkok; the Royal Palace at Bangkok remarkable by a consolidation of reinforced concrete; storagebins for limestone and clay supporting on the top two bruising mills of the greatest size, the whole construction with the raw materials contained weighing 1,080 tons is supported by 16 columns of reinforced concrete of 14-in. diameter.

The good behavior of the cement of Haiphong in sea water has been equally shown by numerous and conclusive experiments carried out by the laboratory of the board of public works.

The Haiphong Cement Works not only send their products all over Indo-China, but they ship considerable quantities into other countries, China, Philippines, Siam, Netherlands India, Singapore, etc.

The present production capacity is 150,000 tons. This will be shortly doubled by a new factory, now in course of building, furnished with the most up-to-date equipment, more particularly six compound-crushers "Centaure" and eight kilns P.C. with automatic discharge and large output, of the most improved type. It is therefore one of the most important industries of Indo-China and of the whole Far East; after carrying through all the new instalments, the factory will take place among the most important cement works in the world.

A workshop provided with the most perfect equipment for manufacturing barrels is attached to the plant, the timber of the country is used for it, as it was found quite appropriate for this purpose. Owing to the necessary enlargement required by this workshop, it will be rebuilt to include saw-mill and cooperage, fitted transforming into barrels more than six hundred logs of timber a day.

The board of this important society is composed as follows: Messrs. E. Candlot (Président) and R. Ferrant (Membres du Comité de Direction), Ch. Candlot, F. Lebreton, L. Marchegay, N. Perpignani and R. Thion de la Chaume and as general secretary, Mr. Ch. Thomonn, ingénieur des arts et manufactures.

The general direction was assumed, in the beginning, by Mr. N. Perpignani, and afterwards, during more than twenty years, by the late Mr. J. Barriere; the actual general manager is Mr. G. Chenu, ingénieur E.P.C.

The Société des Ciments de l'Indo-Chine obtained a "Grand Prix" at the exhibition of Hanoi in 1903; a "Grand Prix" at the exhibition of Marseilles in 1906, at the exhibition of Liège in 1904 the society was hors concours, membre du jury.

Unfair Competition Forbidden by Law

WRITING in the *Dodge Idea*, Mr. Ralph J. Butz defines the law on unfair competition and answers some questions which apply to every line of business where an established name is used by a competitor in confusing the public. Mr. Butz says:

"Unfair methods of competition have been the cause of many cases in the courts, and during the last ten years especially, various state and federal laws have been enacted for the protection of the business man who suffers as a result of unfair methods practiced by his competitors. Federal and state authorities are also, as far as is practicable, lending their assistance to overcome this evil.

"The methods practiced by competitors of this class are, of course, as many and varied as their ingenuity can devise. However, one of the most common methods resorted to, is the use of the trade name and private brand of a successful firm, and to leave the purchaser under the impression that he is getting the article which is well known and favorably regarded. This deception is practiced by marking the goods with the mark by which they have always been known to the trade, or placing by them in containers similar to the ones used by the firm whose reputation for the goods has been established.

"When such deception is practiced by a competitor, confusion is likely to result, and it will undoubtedly work to the injury of the firm whose trade name and private brands have become favorably known to the public through years of satisfactory and successful service.

"On this point the law has been stated very plainly in the following manner: 'A dealer, coming into a field already occupied by a rival of established reputation, must do nothing which will necessarily create or increase confusion between his goods or business and the goods or business of his rival.'

"Also, 'Irrespective of the question of trademark, a manufacturer has no right to inclose his product in packages so like those of a rival manufacturer as to deceive a purchaser, or to enable a dealer to do so.'

"The principle prohibiting unfair trade methods applies to every line of trade. Every man in business has a perfect right to carry on spirited competition with other business men, and the law cannot by any means be construed as opposing competition. It is only when one business man's false pretenses tend to mislead customers and to work harm to a rival that the law will interfere. And this interference by the law is entirely justifiable for when a business man or firm has spent years in development of its trade, then they should be protected against the wanton misuse of trade names and private brands which have become known to the public only through the expenditure of much energy and advertising.

"In another case where a defendant used unfair methods against an established rival, the court said: 'The test is whether the label or mark is calculated to deceive the public, and lead them to suppose they are purchasing an article manufactured by a person other than the one offering it for sale. It may be stated broadly that any conduct, the natural and probable tendency and effect of which is to deceive the public, so as to pass off the goods of one person as that of another, constitutes actionable unfair competition.'"

Even the Lumber Men Protest

IN a very exhaustive survey of the export lumber trade of the Pacific Northwest written by Frank Foster for the *West Coast Lumberman*, he nails the lies that were circulated about the use the Japanese were making of the large imports of cedar from Pacific coast ports.

"A particularly active form of propaganda being carried on by them just now is that of stirring up ill-feeling against those nations with whom it is all-important that we should have a good understanding. Among the criminal and potentially criminal classes that form the larger part of their readers there is a dim idea that the abuse of other nations is evidence of patriotism toward one's own. Now trading with foreign nations is based very largely on mutual confidence; and the propaganda carried on by certain newspapers in this country against the Japanese is distinctly hostile to our trade with Japan. The dense ignorance of the matter in hand that is sometimes displayed in these acrimonious comments is hardly complimentary to the intellect of the reader; but it seems to be good enough for them or it would hardly continue.

"On one occasion a warning note was sounded concerning the immense quantity of cedar (eleven million feet or more) which had been shipped to Japan from this coast, ostensibly for the manufacture of lead pencils, but really for the construction of bomb-carrying airplanes to devastate our coast cities. It must be admitted that eleven million feet of suitable lumber would build some fleet of airplanes; say about thirty thousand. But red cedar is a brittle wood, and the wood for airplanes must be of the toughest and most elastic. Some of us remember the difficulty there was in getting even spruce of the requisite grade for the purpose. Moreover, the vibration of an airplane presents some exceptional difficulties to be overcome in its construction. Red cedar has a rather exceptional feature itself; it is so susceptible to vibration as to be unsuitable for the temporary ties used on logging roads because the vibration of the rails will loosen the spikes. It has no "holding" quality. Imagine such a wood used in the construction of an airplane! Yet the readers of this alarmist literature apparently accepted the statement as an incontestable fact."

Sir W. G. Armstrong Whitworth & Co.

Sir W. G. Armstrong Whitworth & Co., Ltd., well-known shipbuilding and armament manufacturers of Newcastle-on-Tyne, are the latest British engineering contractors to interest themselves in the possibilities of China as an outlet for their varied and comprehensive products, and an office has been opened in Peking which will be under the direction of Mr. R. A. S. Waters, their resident representative in China.

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